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Draft Environmental Impact Statement for Southwest Orange County, Florida Wastewater Management

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Atlanta, GA

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October 1984

EPA

Environmental Impact Statement

Draft

Southwest Orange County, Florida Wastewater Management

REPRODUCED BY
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SPRINGFIELD, VA. 22161

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
for
SOUTHWEST ORANGE COUNTY, FLORIDA

Prepared by
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia 30365

This Draft EIS addresses proposed wastewater facilities for Southwest Orange County, Florida. Numerous wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the sensitive natural and human resources of the area.

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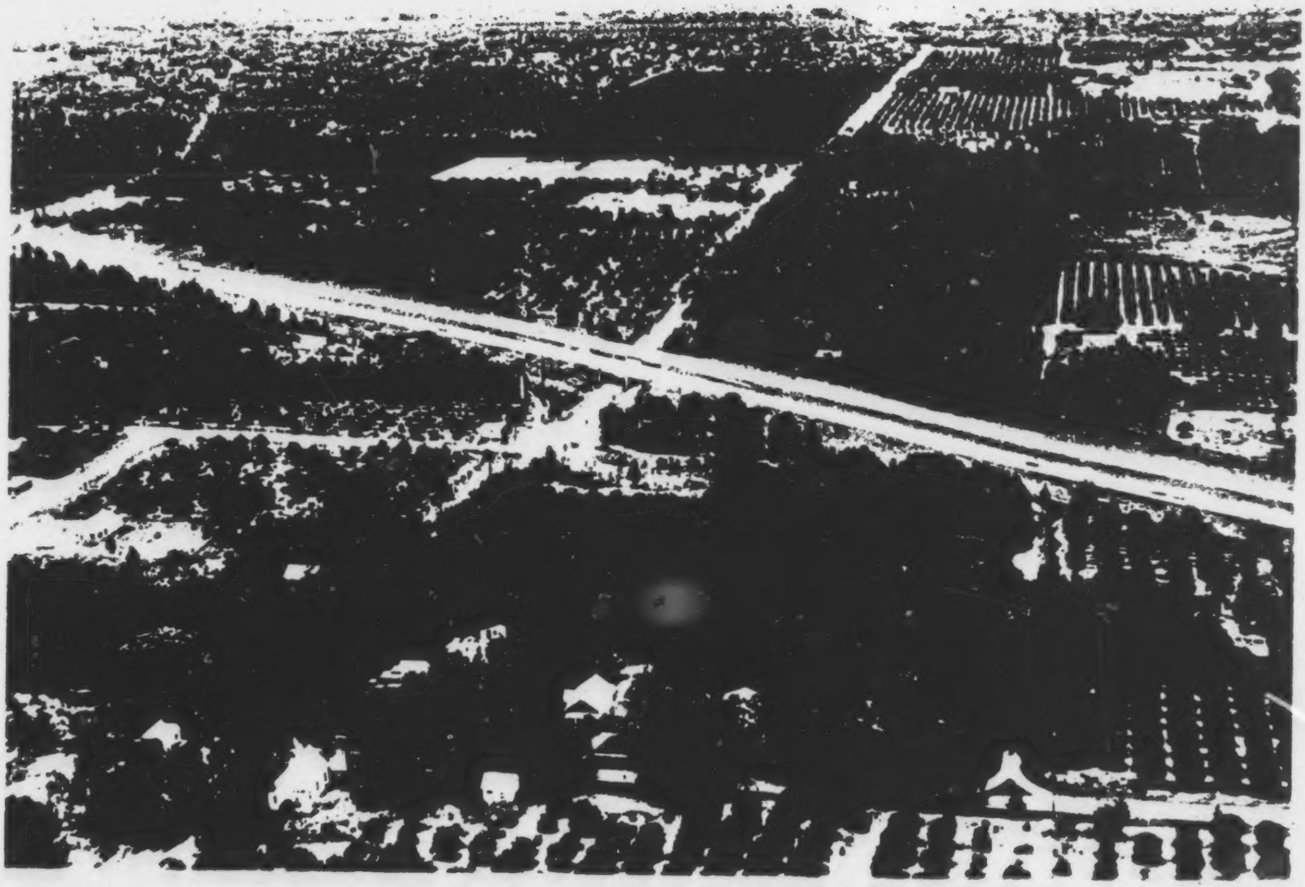
EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

PART A - NEED FOR ACTION

The Environmental Impact Statement (EIS) for the Southwest Orange County 201 Wastewater Facilities Planning Area addresses alternate wastewater management facilities and the potential impacts of these facilities on the environmental resources of the area. The study area for the EIS includes the southwestern quarter of Orange County with the exclusion of the Reedy Creek Improvement District (RCID) as shown in Map I-1. Southwest Orange County is one of the most rapidly developing areas in the U.S. Growth in the area has been spurred by the development of the tourist and manufacturing industries. The Orlando area is the number one tourist destination in the world. Major tourist attractions and large hotels are located in the southwestern portion of the Planning Area.

Centralized wastewater collection systems within the 201 Planning Area are owned and operated by Orange County, the City of Orlando and the City of Winter Park. Orange County and the City of Orlando own and operate the two centralized wastewater treatment facilities located in the 201 Planning Area. Discharge of treated wastewater effluent from these facilities is to Shingle Creek. Twenty-five package plants with design flows equal to or less than 0.75 mgd and utilizing on site land disposal also exist. On-lot septic tank systems provide service to most of the rural and urban fringe areas.

The EPA has determined that nutrient loadings from the Orange County Sand Lake Road and City of Orlando McLeod Road treatment plants are transported by Shingle Creek to Lake Tohopekaliga in Osceola County and have contributed to the eutrophication of the lake. The value of Lake Tohopekaliga as a recreational sportfishery is being jeopardized as a result of deteriorating water quality. In accordance with recommendations of various federal, state and regional water quality studies, NPDES Permits issued by the U.S.E.P.A. for both facilities state that in the future no discharge to surface waters will be permitted. Both plants have been operating for several years under temporary operating permits from the Florida Department of Environmental Regulation (FDER) until plans to eliminate the discharges can be completed and implemented.

It was concluded from the drilling and evaluation of potential discharge zones of a deep (6,192 feet) test well by Orange County in 1977 that deep well injection was not a viable option in Southwest Orange County. Subsequently, Orange County agreed to act as lead applicant for a grant from EPA to prepare a 201 Facilities Plan for the Southwest Orange County 201 Planning Area. In May 1978 Orange County and EPA signed a Memorandum of Understanding which provided that a "piggy-back" Environmental Impact Statement would be prepared "in connection with the

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planning, design and construction of treatment works in Orange County...". In the Notice of Intent, EPA stated that the major issues which were to be addressed in the EIS include the means of effluent disposal, effects on area water resources and economic impacts of secondary growth.

PART B - DESCRIPTION OF THE ALTERNATIVES

Feasible alternatives were developed in the 201 Plan to provide for wastewater collection, treatment and disposal. Centralized systems were considered only in the area designated for the provision of urban services in the approved Growth Management Plans (GMPs). The majority of land in the 201 Planning Area is designated as Rural Service Area. Publicly owned wastewater or water supply systems are, by policy, not to be provided in the Rural Service Area. Projected Year 2000 wastewater flows of about 43 million gallons per day were estimated for the Urban Service Area portion of the Planning Area based on population projections developed for the Orange County and City of Orlando GMPs.

Growth management policies encourage low density residential land uses in the Rural Service Area, and high density residential, industrial and commercial land uses in the Urban Service Area to reduce the cost of providing public services. Therefore, the 201 Plan addresses centralized wastewater management only in the Urban Service Area portion of the Planning Area. Although various service area and interceptor alternatives were considered, the potential area to be served by publicly owned systems remained constant. The potential use and cost-effectiveness of septic tanks in the Urban Service Area was also evaluated in the 201 Plan. The remainder of this section presents a description of each of the final set of wastewater treatment and disposal alternatives for the service area and interceptor alternative considered to be most cost-effective. Maps depicting these alternatives are presented in Chapter II of this EIS on Maps II-10 through II-13. The most cost-effective service area/interceptor alternative is depicted on Maps II-4 and II-9.

Discharge to Shingle Creek

This alternative involves the continued discharge of wastewater effluent from the Orange County Sand Lake Road and City of Orlando McLeod Road treatment facilities at their existing discharge locations. Inclusion of this alternative is for the sole purpose of determining the level of EPA grant funding. This is because Orange County and the City of Orlando have agreed to eliminate the discharges of wastewater effluent to Shingle Creek from their respective facilities. To determine the level of grant funding, the EPA required, through its Advanced Treatment Review Process that two levels of treatment and nitrogen and phosphorus removal be evaluated. These are as follows:

a) Secondary treatment plus nitrogen and phosphorus control to 3 mg/l -- total nitrogen and 0.2 mg/l -- total phosphorus; and

b) Secondary treatment plus phosphorus control to 0.2 mg/l -- total phosphorus.

Shallow Well Injection

This alternative, called the Groundwater Conservation Program (GCP), involves the injection of highly treated wastewater effluent into the upper zone of the Floridan Aquifer. Reclaimed wastewater would be pumped from the treatment plants to injection areas and then distributed to injection wells. The injection wells would be spaced linearly at 1,000-foot intervals to minimize build-up of aquifer potentiometric levels. Each well would inject from 1.8 to 3.0 million gallons per day (mgd). Potential injection zones were selected based on proximity to existing wells, existing and projected land use, and hydrogeologic considerations. The concept of this alternative was developed during a drought period as a means of replenishing the aquifer.

Citrus Irrigation

This alternative involves the slow rate irrigation of about 10,000 acres of existing citrus groves in western Orange County and eastern Lake County. The wastewater treatment level required for this alternative involves secondary treatment followed by filtration and high level disinfection. Under this alternative, land would not be acquired nor irrigation systems funded for citrus irrigation. Instead, renovated wastewater would be provided under pressure to the property lines of the groves. The grove owners would be responsible for the construction, operation and maintenance of their individual irrigation and distribution systems. Renovated wastewater from the treatment facilities would be pumped to a distribution center located near the center of the area of the proposed irrigation target area. A reserve storage reservoir, located south of the distribution center and east of Lake Ingram, would also be needed due to short-term minimum and peak irrigation and freeze protection requirements and scheduling. Required storage volume would range from about 900 to 2400 acre-feet. The reservoir would, therefore, require from 170 to 420 acres at a depth of about 5.5 feet. Average annual citrus irrigation rates were estimated to range from 26 to 72 inches, depending on local conditions.

Rapid Infiltration Basins

This method of effluent disposal involves application of treated effluent to infiltration basins located in the well-drained sandy soils of western Orange County. The infiltration basins would be constructed as long, narrow channels following the existing topography of the proposed sites. Effluent would be applied to flood the basins for a period of one to two weeks. The basins would then be allowed to dry for about the same period, or longer, before beginning the next wetting/drying cycle. Effluent percolating through the basins would enter the water table and move downward and/or laterally away from the site. Secondary treatment followed by filtration and high level disinfection was determined to be the required treatment level for this disposal method. This treatment level has been found to be an effective method of inactivating viruses and bacteria in wastewater effluents.

Deep Well Disposal

This alternative involves the injection of treated effluent into a highly transmissive rock zone containing waters saturated with salt. Potential injection zones must be separated from freshwater aquifers by confining layers which would prevent or significantly retard upward movement of the injected effluent. Potential injection areas were identified in extreme eastern portions of Orange and Osceola Counties, and in Brevard County. Specific sites were not identified due to the lack of adequate data regarding potential injection zones. A testing program would be required as an initial step in implementation of this alternative. If results of the testing program were satisfactory, actual sites for injection wells would be determined.

Combined Citrus Irrigation/Rapid Infiltration

This alternative involves the use of a combination of the citrus irrigation and rapid infiltration alternatives. The distribution center and citrus irrigation target area proposed under the citrus irrigation alternative are also proposed under this alternative. Wells would be used for satisfying peak citrus irrigation and freeze protection demand, eliminating the requirement for the storage reservoir. Rapid infiltration sites are identical to those proposed for the rapid infiltration alternative. However, fewer sites would be required under this alternative approach. These sites would be used to dispose of the renovated wastewater not directed to the citrus irrigation system. The treatment required is secondary treatment followed by filtration and high level chlorination.

On-Lot Disposal

This alternative involves the use of the combinedcitrus irrigation/rapid infiltration alternative, with on-lot systems (septic tanks) servicing about 2.3 mgd of the projected Year 2000 wastewater flow. Total flow to the citrus irrigation/rapid infiltration system would be reduced to approximately 41 mgd. Septic tanks would be used in projected low density residential development areas within the Urban Service Area having suitable soils.

No Federal Action

This alternative involves the use of septic tanks and locally funded subregional treatment facilities to treat the projected wastewater flow in excess of the existing design capacities of the Sand Lake Road and McLeod treatment facilities, i.e. 15 and 13 mgd, respectively. Approximately 2.3 mgd of the projected Year 2000 flow would be handled by septic tanks. Two subregional treatment facilities would be constructed to treat the remaining Year 2000 projected flow of 13 mgd. One of these subregional facilities (Northwest Subregional) would be located in the northwestern portion of the 201 Planning Area having a treatment capacity of 6 mgd. The other subregional facility would be constructed at the site of the existing Orangewood Lift Station located south of the Sand Lake Road facility. Treated wastewater effluent from the McLeod Road, Sand Lake Road and Orangewood Subregional plants would be pumped to the citrus irrigation/rapid infiltration facilities proposed in the combined alternative. The effluent from the Northwest Subregional facility would be disposed of by rapid infiltration at sites in the vicinity of the plant. Secondary treatment followed by filtration and high level disinfection is the treatment required at each facility.

No Action

This alternative would involve no action on the part of the 201 participants. The existing facilities would remain at their present capacities and allow continued discharge of effluents to Shingle Creek. This would result in the continued eutrophication and degradation of Lake Tohopekaliga. New development within the existing service area would be allowed to connect to the sewer system until the plant capacities were reached. Any additional development would provide their own wastewater treatment and disposal facilities. These would include septic tank systems and package wastewater treatment facilities. This alternative is not acceptable to either the state and federal regulatory agencies or the 201 participants. It would also result in serious conflicts with the Orange County Growth Management Policy's objective of using the provision public services to direct and guide growth. The no action alternative is not considered a viable option, but is used for purposes of comparison with the "action" alternatives.

PART C - EVALUATION OF ALTERNATIVES

The alternatives described above were evaluated in terms of cost, operability, implementability and environmental impact. The evaluation of the alternatives with respect to these categories is summarized in Table 1.

TABLE I

ALTERNATIVES EVALUATION SUMMARY

ALTERNATIVE	PRESENT WORTH COST (MILLION)	ENVIRONMENTAL IMPACTS	IMPLEMENTABILITY	OPERABILITY
Discharge to Shingle Creek a) Nitrogen & Phosphorus Control b) Phosphorus Control	 $238.66 285.26	1. Continued and increasing losses of water resource to surface water discharge. 2. Extent of Lake Tohopekaliga water quality improvement uncertain. 3. High electrical energy consumption. 4. Increased sludge production and disposal quantities.	1. Not acceptable to 201 participants or regulatory agencies.	1. Increased O&M requirements. 2. Sophisticated treatment systems and controls.
Groundwater Conservation Program	329.62	1. Greatest potential for flooding impacts to adjacent residential properties due to increased lake and groundwater levels. 2. Increases potential for sinkhole development in urban areas. 3. Increased stormwater runoff in areas of induced higher water tables. 4. Increases recharge to water supply aquifer by reuse of renovated effluent. 5. Eliminates discharge to Shingle Creek/Lake Tohopekaliga.	1. Regulatory constraints uncertain. 2. Public acceptance doubtful.	1. Increased O&M requirements. 2. Sophisticated treatment systems and controls.
Citrus Irrigation	177.28	1. Minimizes land required for land application of renovated wastewater. 2. Eliminates discharge to Shingle Creek/Lake Tohopekaliga. 3. Increases recharge to water supply aquifer. 4. Increases in area lake levels and water tables. 5. Enhances productivity and viability of citrus industry.	1. Acceptable to regulatory agencies. 2. Growers willing to accept renovated wastewater for irrigation.	1. Use of renovated wastewater conditioned on effluent quality. 2. Cyclic irrigation demand requires large storage volumes for minimum and peak demand. 3. Treatment systems and controls generally reliable and not complex.
Rapid Infiltration Basins	168.24	1. Increases in area lake levels and water tables may affect property values. 2. Eliminates discharge to Shingle Creek/Lake Tohopekaliga. 3. Increases potential for sinkhole development in rural areas. 4. Increases nutrient load to adjacent lakes via groundwater flow. 5. Increases recharge to water supply aquifer.	1. Acceptable to regulatory agencies. 2. Local acceptance of RIBs may require project modifications.	1. Treatment systems and controls generally reliable. 2. Hydraulic and renovative capability of basins may require modifications to project after commencing operation.
Deep Well Disposal	216.78	1. Continued and increasing losses of water resource to non-potable aquifer (reclaiming may be possible in future). 2. Eliminates discharge to Shingle Creek/Lake Tohopekaliga. 3. Land required is minimal.	1. Requires location of suitable injection zone(s) and test well program.	1. Treatment systems and controls reliable.

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TABLE 1
ALTERNATIVES EVALUATION SUMMARY
(Continued)

16<

ALTERNATIVE	PRESENT WORTH COST (MILLIONS)	ENVIRONMENTAL IMPACTS	IMPLEMENTABILITY	OPERABILITY
Deep Well Disposal (Continued)			2. Generally acceptable to regulatory agencies, except for time required to implement.	
Citrus Irrigation/Rapid Infiltration Basins	$163.43	1. Decreases potential level of adverse impacts of total rapid infiltration basin alternative. 2. Eliminates discharge to Shingle Creek/Lake Tohopekaliga. 3. Increases recharge to water supply aquifer. 4. Enhances productivity and viability of citrus industry. 5. Aesthitic impacts of RIBs on surrounding properties could impact property values.	1. Acceptable to regulatory agencies. 2. Local acceptance of RIBs may require project modifications. 3. Growers willing to accept renovated wastewater for irrigation.	1. Dual disposal systems increases reliability and flexibility of disposal system. 2. Treatment systems and controls generally reliable.
On-Lot Systems	165.86	1. Conflicts with Orange County Growth Management Policy in Urban Service Area. 2. Septic tank usage in low and medium potential soils could impact lake water quality. 3. Somewhat reduces impacts of citrus irrigation/rapid infiltration basin alternatives, otherwise similar impacts anticipated.	1. Acceptable to regulatory agencies. 2. Local acceptance of RIBs may require project modifications. 3. Growers willing to accept renovated wastewater for irrigation. 4. Increased usage of septic tanks in Urban Service Area may be unacceptable to County.	1. Dual disposal system increases reliability and flexibility of disposal. 2. Treatment systems and controls generally reliable.
No Federal Action	175.18	1. Significant increase in sewer user fees and development costs. 2. Potential conflicts with Orange County Growth Management Policy due to location of Northwest Subregional plant and interceptor system, and septic tank usage in Urban Service Area. 3. Aesthetic impacts of Orangewood Subregional plant on existing land uses. 4. Somewhat reduces impacts of citrus irrigation/rapid infiltration basin alternative, otherwise similar impacts anticipated. 5. Septic tank usage in low and medium potential soils could impact lake water quality.	1. Acceptable to regulatory agencies. 2. Increased usage of septic tanks in Urban Service Area may be unacceptable to County. 3. Local acceptance of RIBs may require project modifications. 4. Growers willing to accept renovated wastewater for irrigation.	1. Increase in O&M required due to increase in number of treatment facilities and separate disposal facilities for Northwest Subregional system. 2. Dual disposal systems increases reliability and flexibility of disposal. 3. Treatment systems and controls generally reliable.

Cost

As can be seen from Table 1, the difference between the highest alternative present worth cost (i.e. groundwater conservation program) is more than twice the lowest alternative present worth cost (i.e. rapid infiltration basins). Three alternatives present worth costs are within 10 percent of the lowest present worth cost, and can be considered to be essentially equivalent based on the level of precision of the cost analysis. Four alternatives, therefore, could have been selected for implementation based on the cost analysis. These are: (1) rapid infiltration basins; (2) citrus irrigation/rapid infiltration; (3) on-lot systems; and (4) no federal action. The latter three alternatives incorporate the combined citrus irrigation/rapid infiltration disposal method.

Operability

Review of the operability summary of Table 1 leads to the conclusion that the least flexibility would be afforded by the rapid infiltration basins alternative. Also, the no federal action alternative would increase the scale and complexity of the operation and maintenance effort required to treat and dispose of the projected wastewater flow. This is because two additional subregional treatment facilities and an additional disposal area would be required.

Implementability

With the exception of the no federal action alternative, all of the four least cost alternatives would be equally implementable. The no federal action alternative would result in significantly increased user charges or development costs, or both. Public acceptance of significantly increased user charges would be very doubtful. Modifications or enhancement of project design criteria would be anticipated to be necessary with respect to potential aesthetic and property value impacts of the proposed RIBs on adjacent areas. Other obstacles to implementation would not be anticipated for these alternatives. The no federal action alternative would be anticipated to be the only alternative with significant implementation problems due to the public and development interests impacts of increased user charges.

Environmental Impacts

Hydrogeologic modeling efforts conducted during the 201 planning effort indicated that the rapid infiltration basin alternative would result in a greater level of impact on lake and groundwater levels than those of the citrus irrigation alternative. This general category of impact is expected for all four least cost alternatives. Impacts on land uses, associated with increased groundwater and lake levels, would be anticipated to be less severe for the alternatives utilizing the combined citrus irrigation/rapid infiltration basin disposal method than the rapid infiltration basin alternative.

The most significant differences in the least cost alternatives incorporating citrus irrigation/rapid infiltration basins are associated with the no federal action alternative. This alternative includes two additional subregional treatment facilities, i.e. the Northwest Subregional and Orangewood Subregional treatment facilities.

The proposed location of the Northwest Subregional plant is in the Clarcona area of rural west Orange County. This plant site is outside the Urban Service Area and could create development pressure in the rural area adjacent to the site and along the interceptor corridor to the plant. The provision of sewer service to development in these areas would conflict with the Orange County Growth Management Policy.

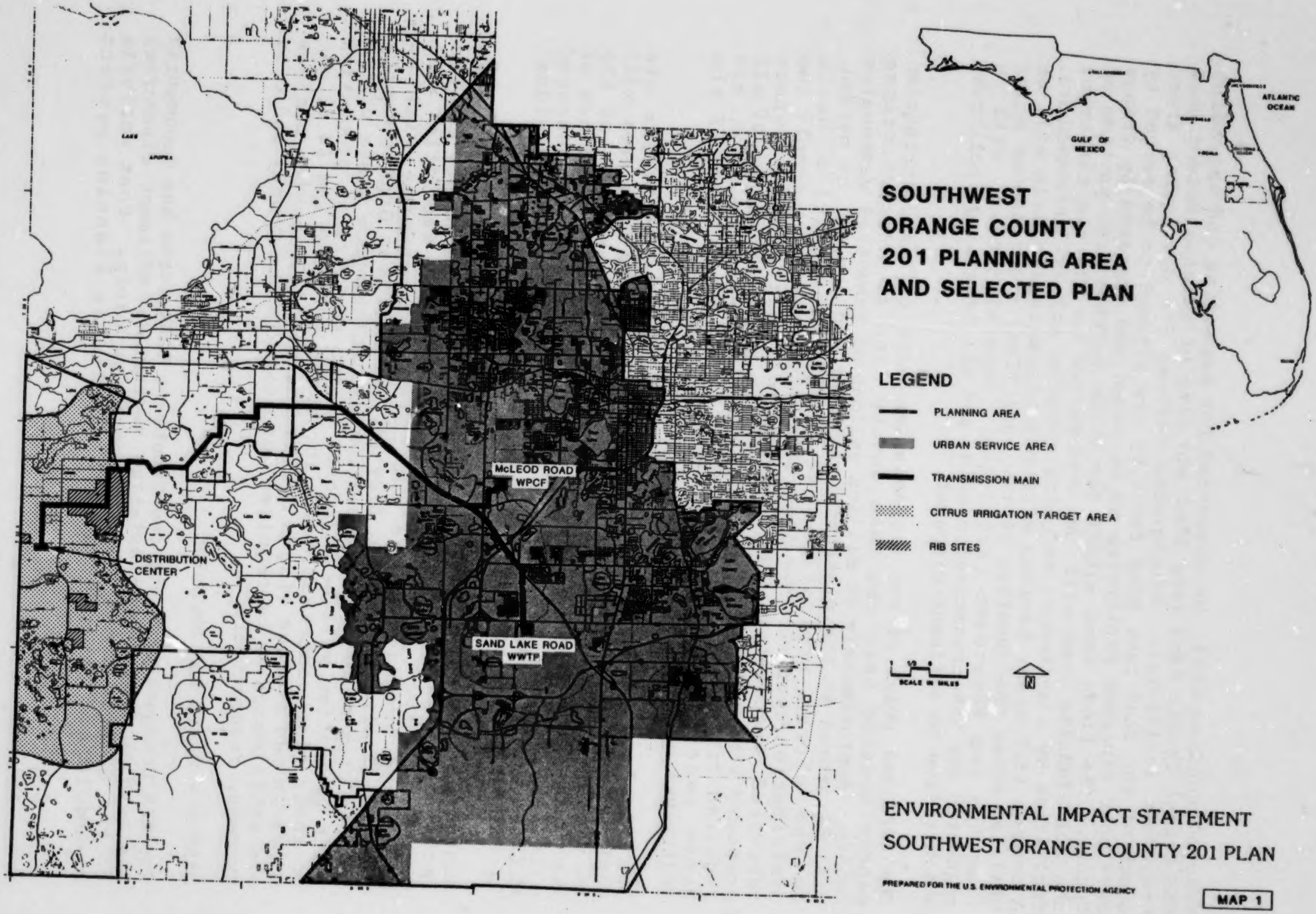
The Orangewood Subregional treatment facility would be located at the site of the existing Orangewood Lift Station south of the Sand Lake Road facility. This is an existing residential area. Aesthetic and odor impacts to this area could occur.

Selection of the no federal action alternative, therefore, could result in potential adverse aesthetic and odor impacts on an existing residential community and potential conflicts with the Orange County Growth Management Policy due to induced growth. In addition, a relatively significant increase in sewer user charges would result.

PART D - DESCRIPTION OF THE PREFERRED ALTERNATIVE

Based on a systematic evaluation of the above alternatives and numerous subalternatives not discussed above, the citrus irrigation/rapid infiltration basin alternative was selected as the most cost-effective and environmentally sound alternative. This alternative was selected over the rapid infiltration and on-lot disposal alternatives on the basis of operational flexibility and cost, respectively. The 201 Planning Area and selected plan are depicted on Map 1.

The citrus irrigation/rapid infiltration basin alternative provides for the productive reuse of renovated wastewater on privately owned citrus groves in west Orange County and east Lake County. Utilization of this renovated wastewater is planned for both crop growth and freeze protection. Rapid infiltration basins will be used to dispose of the renovated wastewater which is not utilized for citrus irrigation. Peak irrigation and freeze protection demands will be supplemented using a system of about 56 supply wells strategically located throughout the renovated wastewater distribution system.



SOUTHWEST ORANGE COUNTY 201 PLANNING AREA AND SELECTED PLAN

GULF OF MEXICO
ATLANTIC OCEAN
LEGEND
PLANNING AREA
URBAN SERVICE AREA
TRANSMISSION MAIN
CITRUS IRRIGATION TARGET AREA
RIB SITES
SCALE IN MILES
N
McLEOD ROAD WPCF
SAND LAKE ROAD WWTP
DISTRIBUTION CENTER

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

MAP 1

Federal funding will be requested for expanding and upgrading the Orange County Sand Lake Road and City of Orlando McLeod Road treatment facilities. Subregional systems for developing areas south of the Sand Lake Road facility are planned to be served by developer financed facilities to be owned and operated by Orange County. The flows from within the Urban Service Area portion of the 201 Planning Area will be transported to the two treatment facilities by a system of existing upgraded and new interceptors. A common 15.5 mile, 54-inch effluent transmission main will be utilized after the junction of two individual transmission mains from the two treatment facilities. Federal funding will be requested for the transmission mains and all remaining facilities which relate to effluent disposal.

The terminal point of the transmission main is the distribution center located near the Lake County line in western Orange County. Approximately 20 million gallons of renovated wastewater will be stored at the distribution center and pumped, as needed, to the citrus irrigation and rapid infiltration basin distribution system. The distribution system will supply the renovated wastewater, under pressure, to the grove owners property line. Construction, operation and maintenance of all required irrigation equipment and distribution piping on the grove owners property will be the responsibility of the individual grove owners.

The final sites selected for rapid infiltration basins are depicted on Map IV-6. Less than 20 percent of the land area will be used for actual basin construction. Reforestation of the remaining site areas is planned in conjunction with retention of existing productive citrus and vegetated areas. Landscaped buffers are also planned in the immediate area of individual basins for visual screening purposes.

Management and costs of the proposed collection and treatment facilities will be the responsibility of Orange County and the City of Orlando. Capital costs for jointly used facilities will be shared equally by the entities in accordance with an interlocal agreement dated July 28, 1983 between Orange County and the City of Orlando. Operation and maintenance costs of the joint facilities will be allocated to the entities in proportion to their flow contributions. Increases of $8.50 and $4.50 per month in the average single family residential service charges are anticipated to be required for users in the County and City systems, respectively.

PART E - BASIS FOR DECISION

The EPA Headquarters Advanced Treatment Task Force has documented the need to upgrade the existing wastewater effluent discharges to the Shingle Creek/Lake Tohopekaliga basin. Cost analysis accomplished through the 201 Facilities Planning process indicated that land disposal options would be less costly to implement on a twenty-year present worth basis than upgrading the treatment levels and continuation of surface water discharge. These cost analyses also indicated that four alternatives could be considered as having essentially equal twenty-year present worth costs. Of these four alternatives, the combined citrus irrigation/rapid infiltration basin alternative was determined to provide the greatest flexibility for disposal. This alternative was also found to be the most environmentally acceptable alternative. Treatment will be provided at the expanded and upgraded Sand Lake Road and McLeod Road treatment facilities and will consist of secondary treatment followed by filtration and high level disinfection,suitable for irrigation with unrestricted public access and human contact.

After the selection of this alternative, several project modifications were incorporated into the design of the project to mitigate the potentially significant impacts identified in this EIS and at public meetings and hearings. These modifications related to the location of the proposed disposal sites, control of lake and groundwater level increases, disposal site aesthetics, and loss of productive citrus areas.

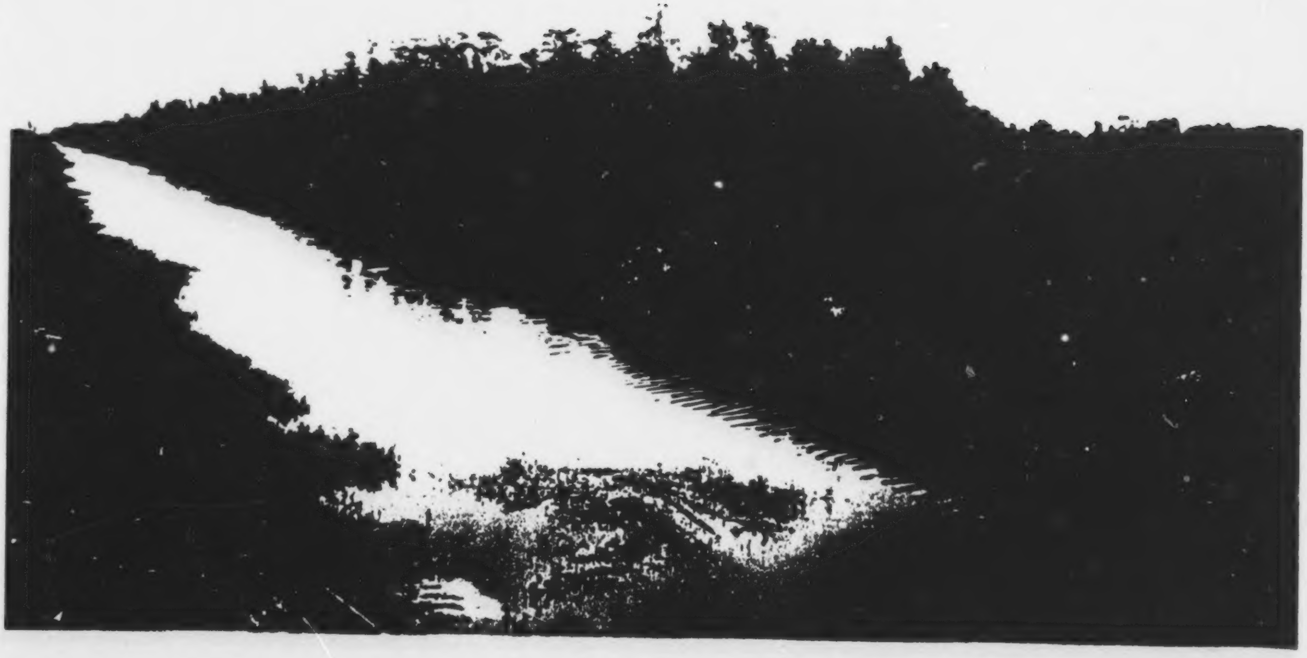
Property owners adjacent to the originally proposed rapid infiltration sites were opposed to these sites because of their close proximity to their community. In addition, concern was expressed that the proposed use of these sites would decrease the value of their properties due to visual aesthetics and odors. As a result of their concerns, the proposed disposal sites were relocated to more acceptable locations, and a Reforestation Plan developed. The Reforestation Plan provides for the retention of existing naturally vegetated areas and productive citrus groves, the reforestation of barren areas, and provision of vegetated buffers around the individual basins. This is foreseen to effectively mitigate the potential aesthetic and odor impacts by enhancement of the existing vista.

Detailed geohydrologic modeling of the impacts of the proposed rapid infiltration basins on groundwater and lake levels was accomplished. This resulted in the establishment of an official County policy regarding maximum acceptable lake level increases for lakes adjacent to the disposal sites and a schedule of remedial actions. Lake level increases to a point eighteen inches below the 100-year flood level of the affected lakes was established as the elevations at which remedial operational procedures would commence. Evaluations of the results of the refined model and proposed operational procedures indicate that the impacts of concern can be effectively mitigated.

The state and federal regulatory agencies have indicated their concurrence with the EIS findings and the importance of the project. Implementation of the project is expected by mid 1986.

CHAPTER ONE

BACKGROUND, PURPOSE AND ISSUES



A. Background

The Environmental Impact Statement for Southwest Orange County, Florida, is being prepared in order to address the impacts associated with wastewater transmission, treatment and disposal facilities proposed in the Southwest Orange County 201 Facilities Plan. Participants in the project include Orange County, the City of Orlando, the City of Edgewood, the City of Belle Isle and the Town of Windermere.

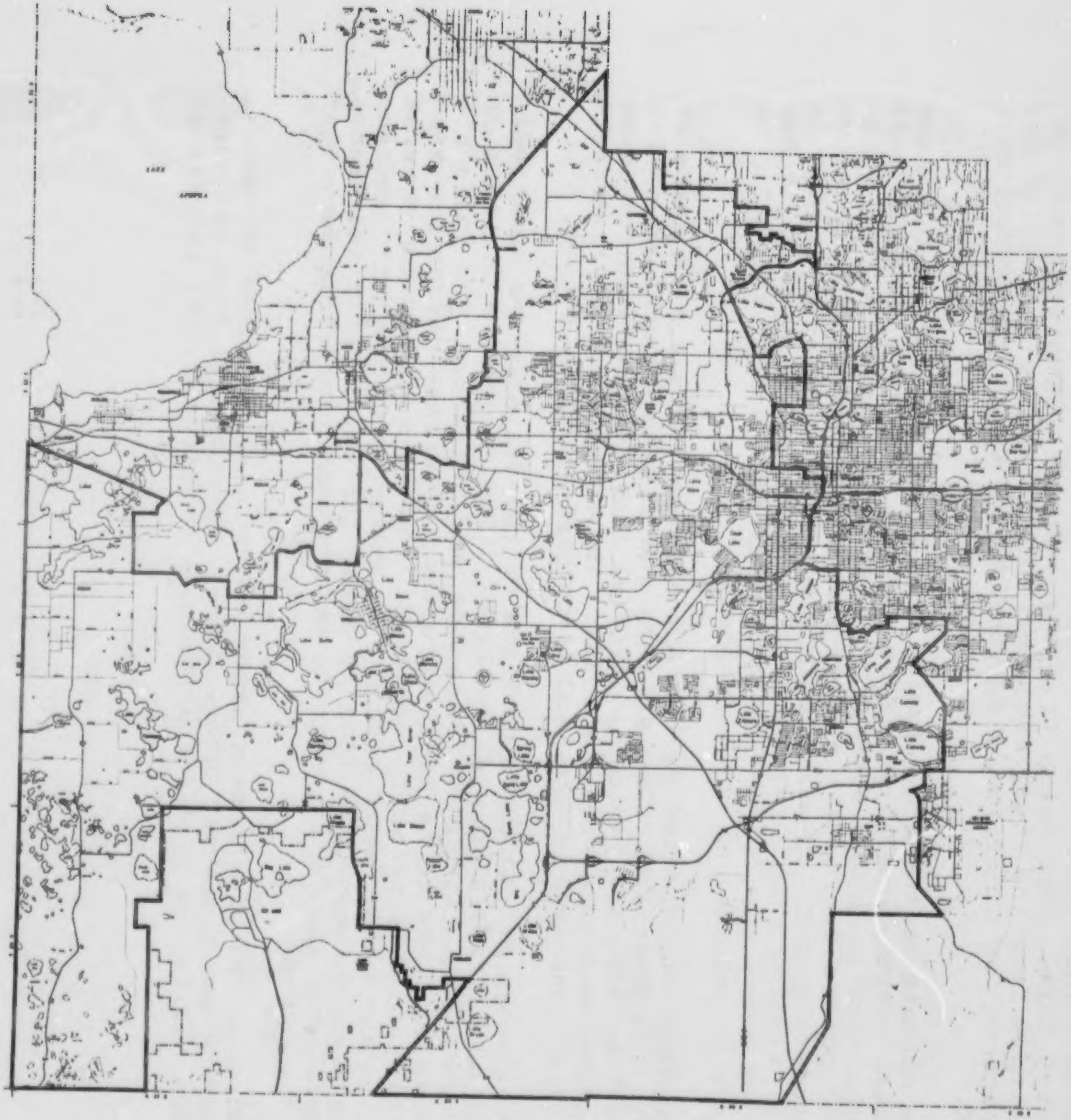
The Southwest Orange County 201 Facilities Planning Area lies entirely within Orange County, Florida. Map I-1 shows the 201 Area and its location within Orange County. The 201 Planning Area includes the western portion of the City of Orlando and three other incorporated communities: the Town of Windermere and the Cities of Belle Isle and Edgewood. The 201 Area extends west to the Orange-Lake County line and south to the Orange-Osceola County line. The Reedy Creek Improvement District has been excluded from the study area because wastewater collection and treatment for the district is provided by Reedy Creek Utilities, Inc.

The climate of the 201 Planning Area is subtropical, with a mean annual temperature of 72.5°F in Orlando. Rainfall is relatively high, with an annual average of 50.27 inches. Most of the rainfall occurs during the summer months, typically as afternoon thundershowers. Evapotranspiration is also relatively high in the planning area. Annual lake evaporation averages 47 inches which means that 93 percent of the average annual rainfall on lakes is returned to the atmosphere.

The land encompassed by the 201 Area includes a wide range of physical features. The western and northern portions of the planning area are typical of central Florida with numerous lakes interspersed among rolling hills. The soils are sandy and well-drained, and much of the land is covered by citrus groves.

The eastern and southern portions of the 201 Area are more typical of Florida's coastal lowlands. The landscape consists of broad open plains, pine flatwoods, and wetlands. The soils are sandy but tend to be poorly drained. The open plains are generally used for cattle grazing. The wetlands areas consist primarily of hardwood swamps. An extensive network of drainage channels has been developed to lower the water table and remove stormwater runoff in order to accommodate the development that has occurred.

Water is one of the most important natural resources of central Florida and southwest Orange County. Groundwater from the Floridan aquifer is used for potable, agricultural, and industrial


LAKE APOPKA

ATLANTIC OCEAN
GULF OF MEXICO

SOUTHWEST ORANGE COUNTY 201 PLANNING AREA

LEGEND

— PLANNING AREA BOUNDARY

SCALE IN MILES

N

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

MAP I-1

water supplies. Surface waters provide a variety of recreational opportunities. The drainage divide between the St. Johns River and Kissimmee River basins crosses the 201 Area. The northern part of the planning area lies within the St. Johns River basin and includes large areas that have no surface outflow. Drainage is to the self-contained lakes in the area or to groundwater. The southern portion of the 201 Area drains south to the Kissimmee basin via Reedy, Shingle, or Boggy Creeks.

Southwest Orange County is one of the most rapidly developing areas in Florida and the United States. Growth in the area has been spurred by the development of tourist and manufacturing industries. One of the major industries in the area is citrus agriculture. However, the dominant factors in the area's growth during the 1950's and 1960's were the development of the aerospace industry at Cape Canaveral and the construction of the Martin-Marietta plant in southwest Orange County. Tourism emerged as a major industry in the late 1960's with the development of Walt Disney World.

On May 20, 1980, the Orange County Board of County Commissioners adopted the Orange County Growth Management Policy. The Growth Management Policy provides a management process that encourges growth in highly developable areas corresponding to Orange County's ability to supply the necessary services. As a result of the policy, Orange County's 1000 square miles were divided into two major areas - the Urban Service Area and the Rural Service Area.

Wastewater collection, treatment and disposal within the 201 Area is accomplished by a combination of privately and publicly owned systems. The privately owned systems include domestic sewage treatment facilities and industrial waste treatment facilities. The publicly owned facilities are operated by Orange County and the City of Orlando. The City of Winter Park also owns and operates a small collection system in the planning area. Map I-2 shows the locations of the treatment facilities.

Orange County has two large central collection systems within the 201 Area. The Northwest Service Area collects wastewater from the Pine Hills, Lake Lawne, and Orlo Vista areas and pumps it into Orlando's McLeod Road System for treatment under a wholesale agreement with Orlando. The Southwest System collects wastewater from developed areas south and southwest of Orlando's McLeod Road service area. This wastewater is treated at the County's Sand Lake Road Wastewater Treatment Facility. The Sand Lake Road facility is an activated sludge plant with a design capacity of 15 mgd. The plant presently discharges to Shingle Creek, and is the only County facility which discharges to surface waters.

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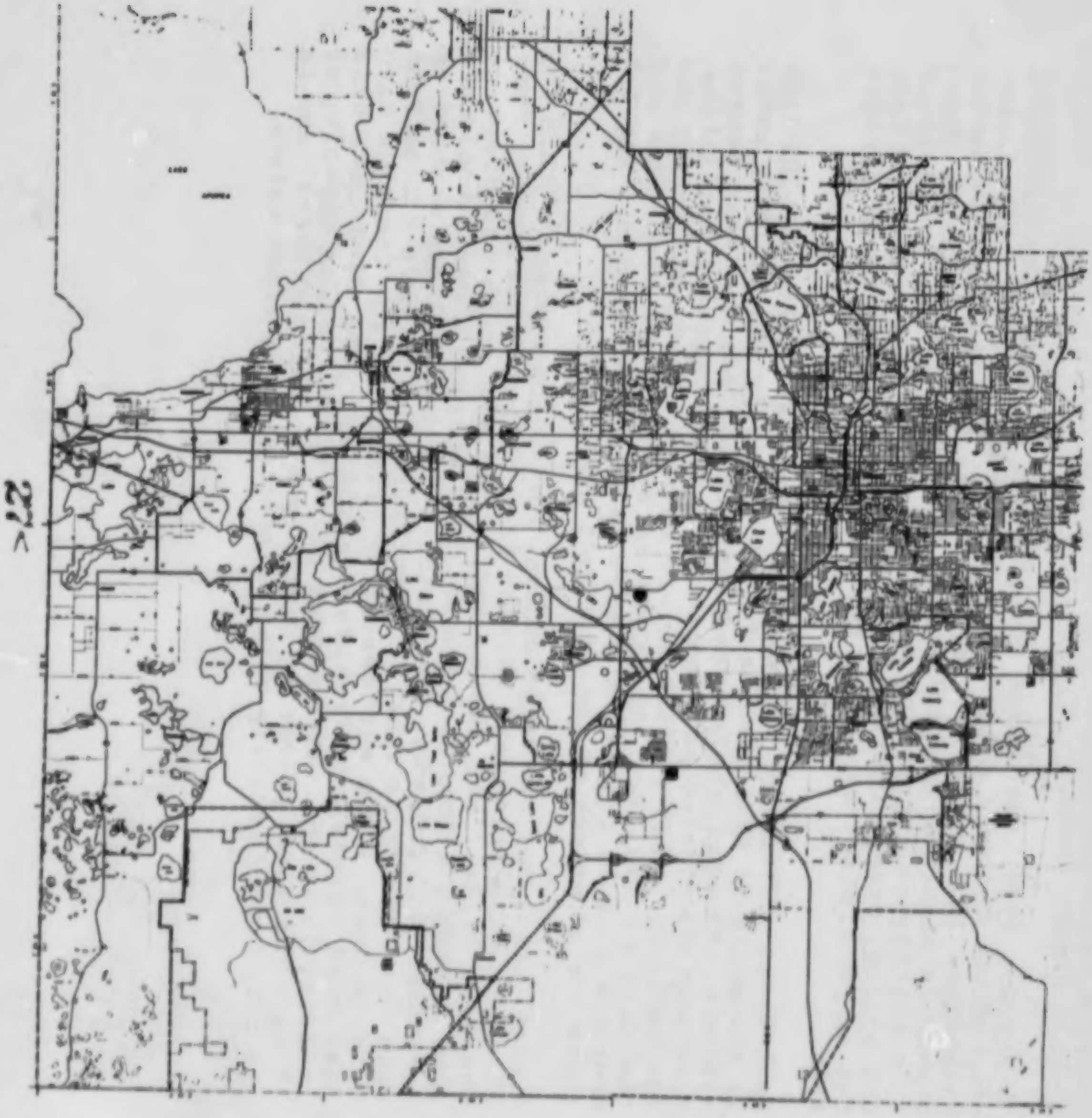


WASTEWATER TREATMENT FACILITIES

LEGEND

- ● McLEOD ROAD WASTEWATER TREATMENT PLANT
- ■ SANDLAKE ROAD WASTEWATER TREATMENT PLANT
- — — PLANNING AREA BOUNDARY

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

MAP I-2

The City of Orlando Westerly Collection System serves essentially all developed areas of the Southwest 201 Area within the Orlando City limits. In addition, wastewater from Orange County's Northwest sewer system and the City of Winter Park's Asbury Park service area are pumped to the City's Westerly system for treatment. The wastewater from the Westerly Collection System is treated at Orlando's McLeod Road Wastewater Treatment Facility. The plant, which has a design capacity of 12 MGD, consists of a complete-mix activated sludge system followed by trickling filters for effluent polishing. The treated wastewater effluent is discharged to Shingle Creek.

Lake Tohopekaliga is the eventual receiving body for the waters of Shingle Creek. A great deal of attention has been focused on the trophic condition of the lake and the impact of point source discharges on the lake water quality. The Florida Game and Freshwater Fish Commission (FG & FWFC) has concluded that because of the deteriorating water quality in Lake Tohopekaliga, the lake will not be capable of supporting the recreational sportfishery at existing levels. FDER, as well as the Florida Game and Freshwater Fish Commission, determined that high nutrient loadings in Shingle Creek caused by wastewater treatment plant effluent were contributing to the eutrophication of Lake Tohopekaliga. In response to the Florida Department of Environmental Regulation's (FDER) "no discharge" requirement, both the City and the County have agreed to eliminate their discharges to Shingle Creek by 1988. A 201 Facilities Planning Program was begun to provide quality wastewater collection, treatment and disposal facilities in the planning area.

EPA determined that sufficient data were available to adequately establish discharge constraints for Lake Tohopekaliga. The EPA Headquarters Advanced Treatment Review Task Force evaluated the lake's water quality and determined effluent requirements. Further studies of water quality in Shingle Creek and Lake Tohopekaliga as part of the 201/EIS program were not necessary.

B. Purpose

The National Environmental Policy Act (NEPA) of 1969, Public Law 91-190, requires the preparation of an Environmental Impact Statement (EIS) for "major Federal actions significantly affecting the quality of the human environment." The purpose of the impact statement is to ensure that environmental and social factors are considered in addition to economic and technical factors during the decision-making process. To that end, the environmental impact statement is to present a detailed description of the environmental impact of the proposed action, any unavoidable adverse impacts that would occur if the action is implemented, and alternatives to the proposed action.

In the Notice of Intent to prepare the EIS on the Southwest Orange County 201 Plan, the Environmental Protection Agency (EPA) stated that the purpose of the study "is to ensure integration of environmental and economic considerations at the earliest stage

28<

of facilities planning." In the Directive of work for this project, EPA further stated that "resolution of the issues of effluent disposal and user charges is required to avoid delay in Step 2 funding and project implementation."

For these reasons, this EIS was prepared concurrently with the 201 Facilities Plan. The "piggy-back" EIS approach allowed the environmental impacts of alternatives to be evaluated and considered during the selection of the proposed action. This approach helped avoid delays in project implementation after the 201 Plan was completed.

C. Major Issues

As stated previously, Southwest Orange County is one of the most rapidly developing areas in Florida and in the U.S. Growth in the area has been spurred by the development of the tourist and manufacturing industries. The area is also attractive for residential development around the lakes and in citrus groves.

In the Notice of Intent to prepare the Environmental Impact Statement for the Southwest Orange County 201 Facilities Plan, EPA stated that "major issues to be addressed include means of effluent disposal, effects on area water resources, and the environmental and economic impacts of secondary growth." Some additional aspects of these major issues are discussed in the following paragraphs.

The disposal of wastewater has become one of the key issues in the 201/EIS project. With the ban on further discharge to Shingle Creek, land application became the primary alternative for wastewater disposal. Other alternatives which were considered include ocean outfall, deep well injection in eastern Orange County, and shallow well injection to the Floridan aquifer.

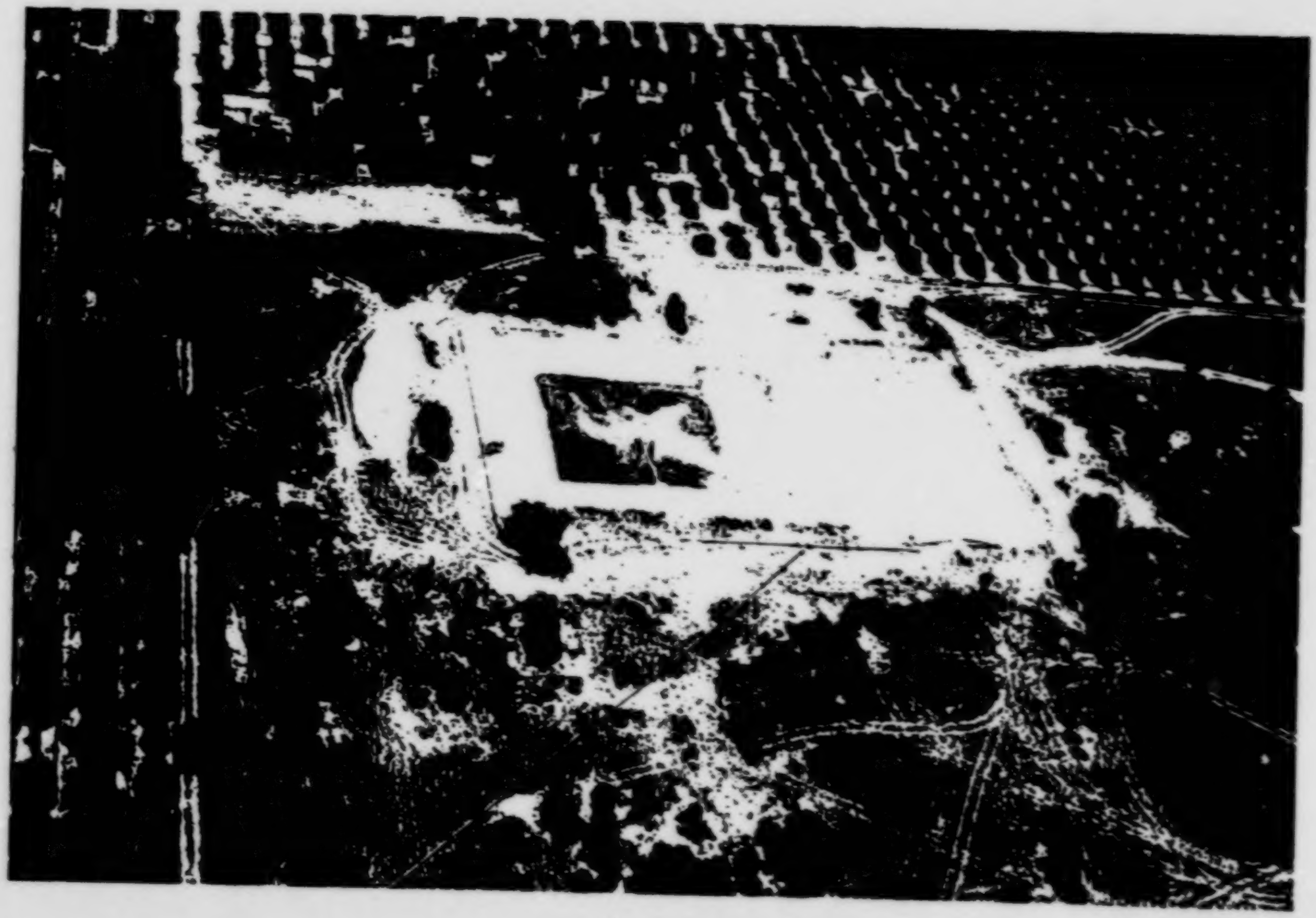
Water is perhaps the most important natural resources of Central Florida. Therefore, protection of the area's water resources is of primary concern in evaluating wastewater disposal alternatives. Residual pollutants in treated wastewater effluent can affect the quality of surface water or groundwater unless proper care is exercised in disposing of the wastewater. With the emphasis on land application for wastewater disposal, the potential impacts on groundwater quality had to be carefully considered. However, treated wastewater effluent represents a valuable resource, if properly managed. Effluents have been used in some areas of the country, to recharge groundwater aquifers and lakes, thereby replacing water withdrawn for water supplies. This possibility could be applicable in Orange County where low rainfall and increased pumping have lowered the potentiometric level of the Floridan aquifer during the past several years. Lake levels have also receeded and resulted in decreased recreational usefulness of some lakes.

There is little doubt that additional sewage treatment capacity would encourage growth in Southwest Orange County. New development in western Orlando and southwest Orange County has recently been limited by the availability of sewage treatment capacity. Orlando's McLeod Road Wastewater Treatment Facility is approaching its design capacity of 12 mgd. Connections to the Orange County Sand Lake Road Wastewater Treatment Facility have been limited under the agreement with the FDER and the Consent Decree by EPA. The limitations on sewage treatment capacity has resulted in increased pressure on the County and City to allow the use of package wastewater treatment plants and septic tanks in this part of the County. These practices could result in unacceptable environmental and public health impacts when they are not properly maintained.

Additional development in the Planning Area could result in secondary environmental impacts, such as the conversion of natural areas and unique agricultural areas to urban uses, and increase the demand for community services and facilities in Southwest Orange County. Increases in groundwater withdrawals for water supply to support this growth could result in further declines in groundwater and lake levels. Surface and groundwater quality could also be affected. The socioeconomic environment, including property values, could be impacted by any significant impact to the water resources of the Planning Area. With the desire of existing residents to maintain the present quality of life in this part of Orange County, the secondary environmental impacts of the growth to be accommodated by the proposed facilities has been a major issue in this study.

CHAPTER TWO

ALTERNATIVES DEVELOPMENT AND EVALUATION



A. INTRODUCTION

The purpose of this chapter is to identify the wastewater management alternatives considered in the 201 planning process. Also included are a summary of the wastewater flow projections for the 201 Facilities Planning Area and a comparison of costs, operability and implementability, as determined in the 201 Plan. A summary of the environmental impacts evaluation performed for these alternatives is provided in Chapter III.

Although a wide range of alternatives was considered for the 201 Planning Area, some existing constraints were present which served to limit these alternatives. These constraints involved Orange County's Growth Management Policy and the lack of acceptable alternates for discharge to surface receiving waters. The Growth Management Policy discourages urban service such as centralized sewer service and, therefore, encourages on-lot systems at low densities in the Rural Service Area. Surface water discharge is a constraint because area lakes have very limited assimilative capacity, and area stream flows approach zero during the winter dry season. However, alternatives for the continued surface discharge to Shingle Creek were evaluated.

Wastewater management alternatives that were evaluated in the 201 Plan included on-lot systems and regional or subregional treatment/disposal facilities utilizing land application, subsurface injection and discharge to Shingle Creek. Nonstructural wastewater management considerations included water conservation, land use and development controls and optimum use of existing facilities.

A "no federal action" alternative was also considered for the Planning Area. This alternative represents the federal option to provide no funding assistance for the construction of expanded wastewater treatment capacity. No federal action would not necessarily limit growth in the Planning Area because local and/or private funding of wastewater facilities is not precluded by this alternative.

The "no action" alternative, which would involve continued discharge of wastewater by the Sand Lake Road and McLeod Road treatment facilities to Shingle Creek at existing treatment levels is considered unacceptable because it would result in an increased rate of eutrophication of Lake Tohopekaliga. Therefore, the "no action" alternative was not considered as a viable alternative for the 201 Planning Area.

B. POPULATION, LAND USE AND WASTEWATER FLOW PROJECTIONS

Projected wastewater flows for the Planning Area in the Year 2000 are generally a function of the projected population, land use and per capita water use. These will be discussed below.

B.1 Population and Land Use

Population projections for the Planning Area were derived through the input and involvement of various agencies. The process of projecting population involved the use of state-derived projections by county. These projections are utilized by the 208 Agency (the East Central Florida Regional Planning Council) as control numbers to develop regional projections. This is accomplished by city and county planning officials in association with the 208 Agency.

There are 140 traffic zones, or portions of traffic zones, located in the 201 Planning Area. A total of 122 of these traffic zones are wholly or partially within the Urban Service Area. The traffic zones and Urban Service Area boundary are shown on Map II-1. Existing and future land use projections for the 201 Planning Area are shown in Maps II-2 and II-3. These were estimated and classified into residential, commercial and industrial land uses.

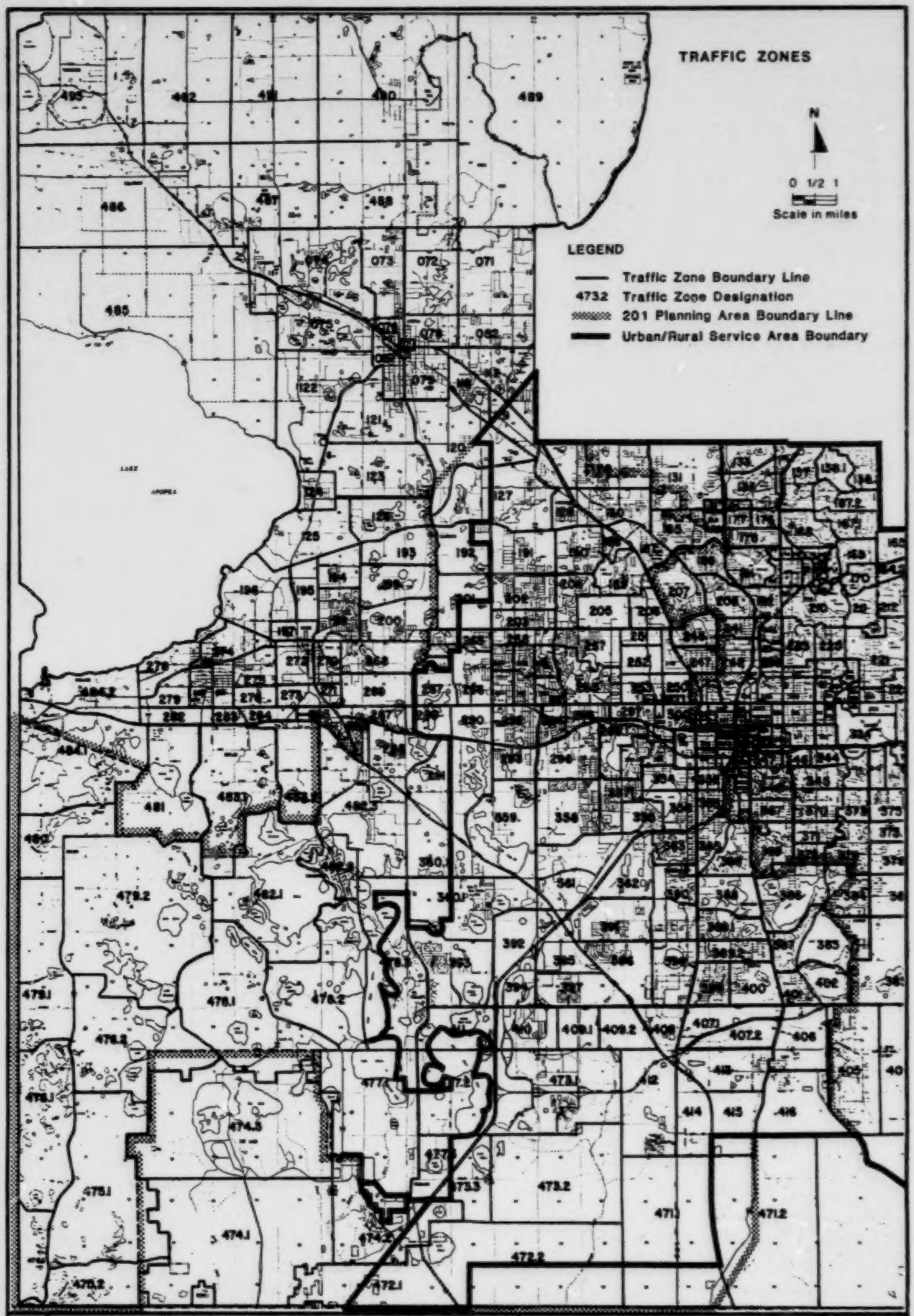
Table A-1 of Appendix A presents the 1980 and projected resident and transient (tourist and seasonal) populations for traffic zones in the Planning Area, in five-year increments, to the Year 2000. The resident population in the Planning Area is projected to increase from 181,542 in 1980 to 295,740 in the Year 2000. Transient population is expected to increase from 25,945 to 69,211 during this period.

B.2 Wastewater Flows

Wastewater projections were accomplished using the population projections and an estimated per capita wastewater generation rate. Non-excessive infiltration/inflow and industrial flows were added to base flow figures. Flow projections were developed on an equivalent population basis. Equivalent population was defined as the permanent residential population plus 80% of the transient population. Contributions from domestic, commercial, institutional and small industrial sources are accounted for in the average daily base flow (ADBF) generation factors.

Allowances for significant industrial wastewater flows were developed separately and added to the average daily base wastewater flows. Industrial wastewater projections were broken into three parts: (1) existing; (2) known planned increases; and (3) unplanned increases. Unplanned increases were accounted for by traffic zone using the greatest of either 5% of the sum of the ADBF, I/I and known industrial flows, or 25% of the known industrial flows in accordance with EPA procedures.

Total ADBF, I/I and industrial Year 2000 projected flows by traffic zone are provided in Table A-2 of Appendix A. Projections for nine of the traffic zones were adjusted in the 201 Plan to account for existing and committed growth in their areas because existing flows were greater than the flows projected for the Year 2000. A total of 43.1 million gallons per day of wastewater from


TRAFFIC ZONES
N
0 1/2 1
Scale in miles
LEGEND
Traffic Zone Boundary Line
4732 Traffic Zone Designation
201 Planning Area Boundary Line
Urban/Rural Service Area Boundary
LAKE APOPKA
489
486
485
488
073
072
071
122
121
123
125
127
131
193
192
195
196
200
205
206
207
252
262
266
272
279
282
290
294
301
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396
400
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402
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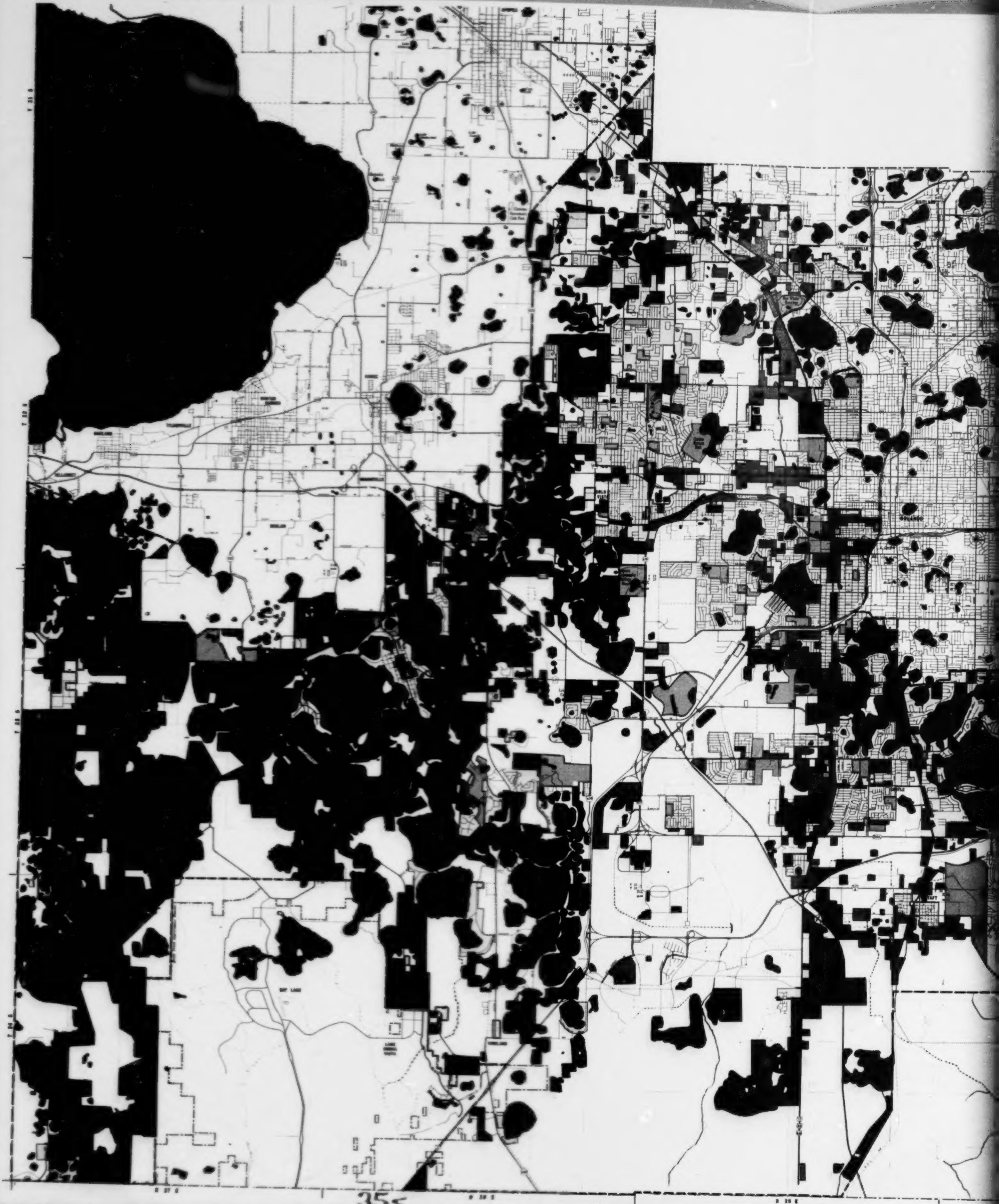
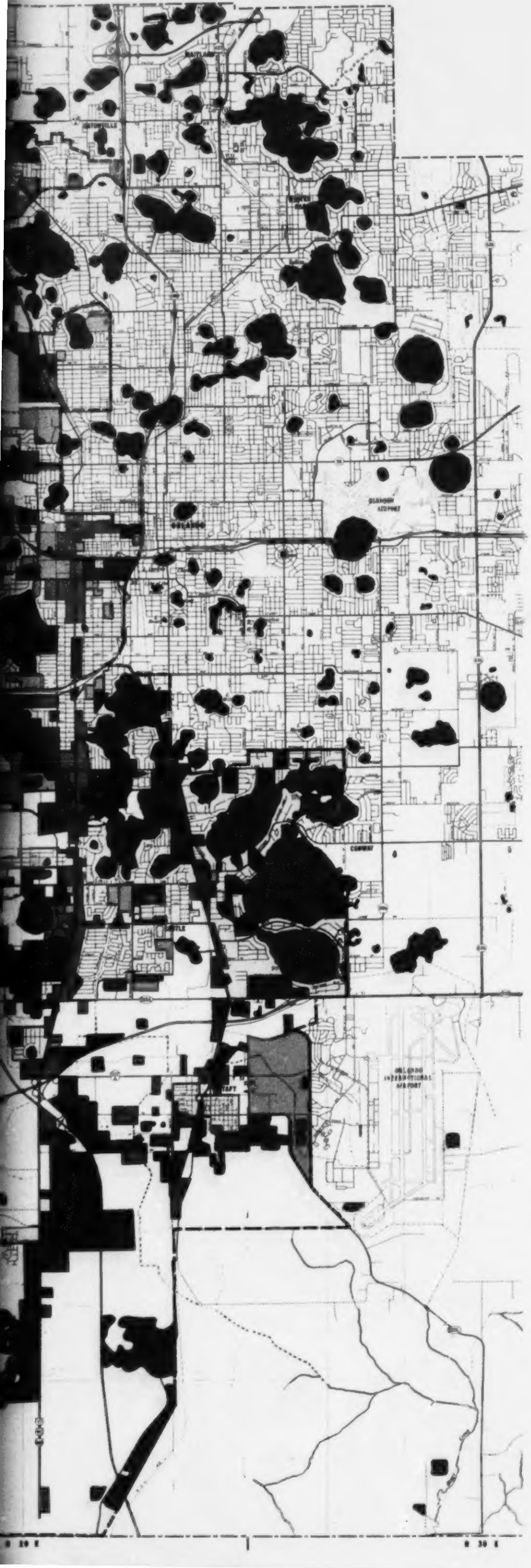
406
407.1
407.2
409.1
409.2
412
414
415
416
471.1
471.2
472.1
472.2
473.1
473.2
473.3
474.1
474.2
474.3
475.1
476.1
476.2
477.1
478.1
478.2
479.1
479.2
480
481
482.1
483.1
484.1
486.2

MAP II-1	ENVIRONMENTAL IMPACT STATEMENT SOUTHWEST ORANGE COUNTY 201 PLAN	PREPARED FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY BY MAYES, SUDDERTH & ETHEREDGE



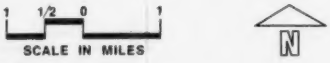


EXISTING LAND USE

LEGEND

- ▢ RESIDENTIAL - SINGLE FAMILY
- ■ RESIDENTIAL - MULTI-FAMILY
- ■ AGRICULTURAL
- ■ INDUSTRIAL
- ▨ CULTURAL-INSTITUTIONAL
- ▨ PARKS-RECREATION
- ▨ TRANSPORTATION-UTILITIES-COMMUNICATIONS
- ■ COMMERCIAL
- ▢ VACANT LAND-FOREST

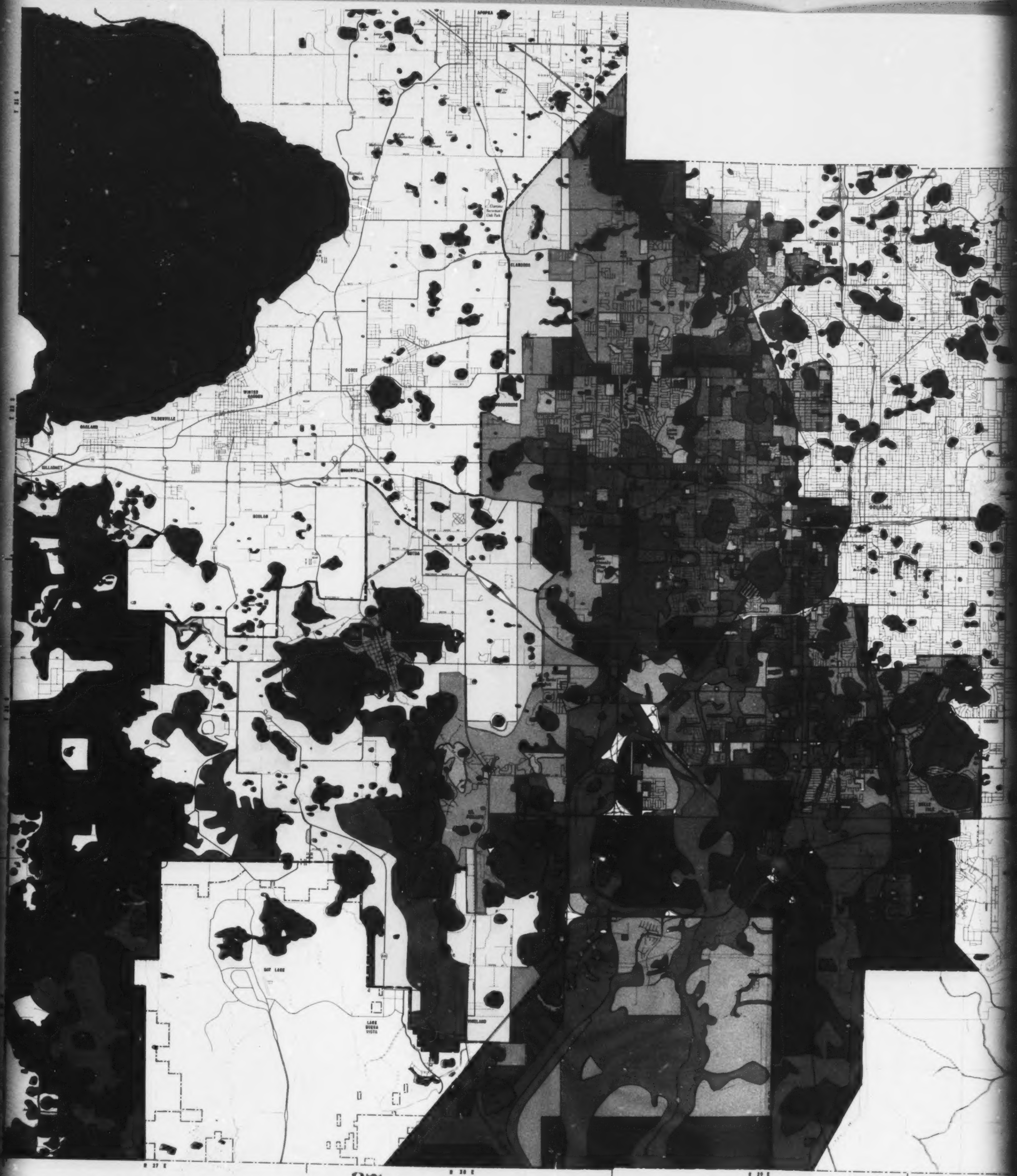
SOURCE: ORANGE COUNTY GROWTH MANAGEMENT POLICY, 1980

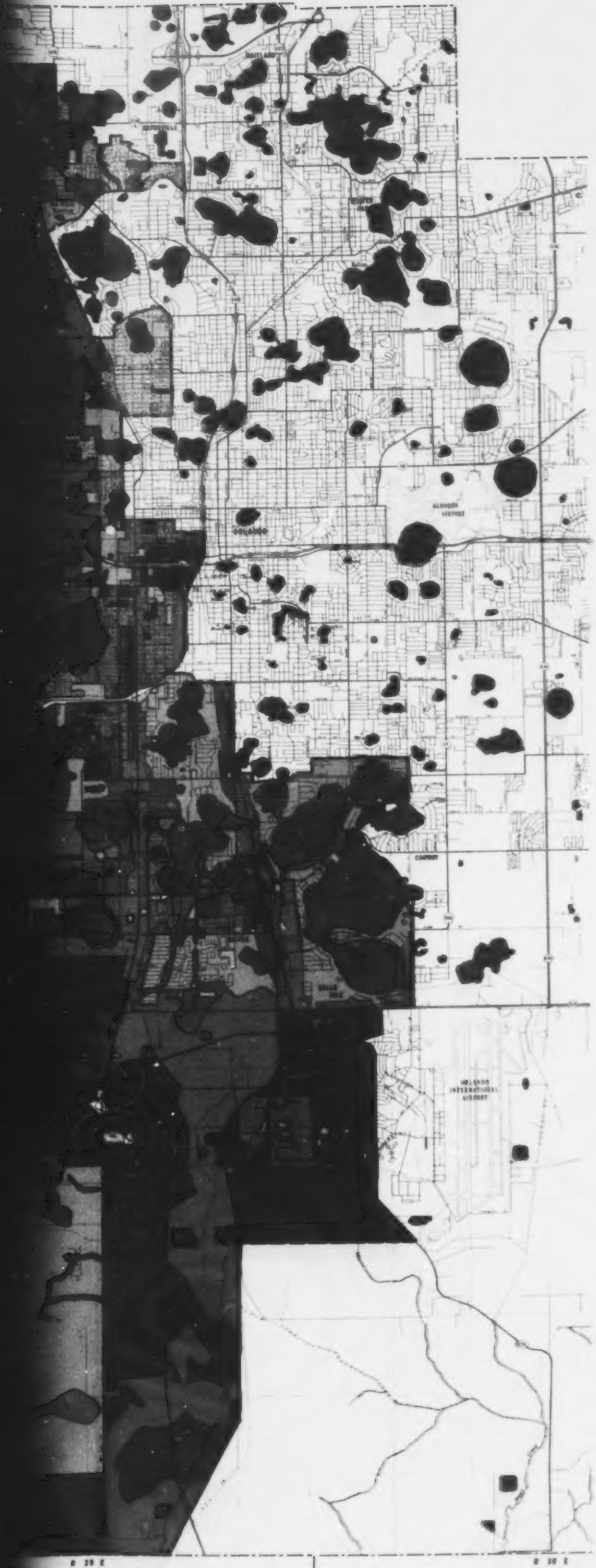


ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

MAP II-2

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY
PREPARED BY ORANGE COUNTY PLANNING DEPARTMENT


APOPKA
OCOEE
WINTER GARDEN
TILDENVILLE
OAKLAND
KILLARNEY
ORLANDO
BAY LAKE
LAKE BUENA VISTA
R 27 E
R 28 E
R 29 E



FUTURE LAND USE POLICY GUIDE

LEGEND

	URBAN RESIDENTIAL	
▨	URBAN ESTATE	1 D.U./ACRE OR LESS
▨	LOW DENSITY	1.01-4.4 D.U./ACRE
▨	LOW-MEDIUM DENSITY	4.5-7.5 D.U./ACRE
▨	MEDIUM DENSITY	7.6-14.9 D.U./ACRE
■	HIGH DENSITY	15 PLUS D.U./ACRE
	RURAL RESIDENTIAL	
☐	RURAL RESIDENTIAL	1 D.U./2 ACRES
☐	RURAL ESTATE	1 D.U./5 ACRES
▨	COMMERCIAL	
■	INDUSTRIAL	
▨	INSTITUTIONAL	
▨	CONSERVATION	
■	AGRICULTURE	
▨	PARKS/RECREATION AREAS	

SOURCE: ORANGE COUNTY GROWTH MANAGEMENT POLICY, 1980

1 1/2 0 1
SCALE IN MILES

N

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

MAP II-3

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY
PREPARED BY ORANGE COUNTY PLANNING DEPARTMENT

within the Urban Service Area portion of the 201 Planning Area is anticipated to be generated in the Year 2000. In conformance with County Growth Management Policies, this does not include any existing or projected wastewater generated in the Rural Service Area portion of the 201 Planning Area. Wastewater generated in this area is to be treated and disposed of by on-lot or other privately financed systems.

C. IDENTIFICATION OF AVAILABLE STRUCTURAL ALTERNATIVES

Structural alternatives were developed for four major components of wastewater management: (1) wastewater collection; (2) wastewater treatment; (3) effluent disposal; and (4) sludge treatment and disposal. Combinations of the components generated several alternatives that were considered in the 201 Facilities Plan. Many of these alternatives were eliminated from consideration due to feasibility and economics. The alternatives that were developed fully for possible implementation are described in this section.

The wastewater collection system alternatives include service areas, major pump stations and interceptors. Wastewater treatment alternatives were developed to provide the required effluent quality for each of the effluent disposal alternatives because they are dependent on the effluent disposal alternative being considered. Quantities and types of sludges generated by wastewater treatment will vary depending on the treatment level and process and, therefore, are also related to the effluent disposal alternatives. The following discussion of structural alternatives will begin with service areas/interceptors, followed by effluent disposal alternatives, wastewater treatment alternatives, and sludge treatment/disposal alternatives. The no federal action alternative is discussed separately.

C.1 Service Areas/Interceptors

The Urban Service Area portion of the 201 Planning Area was divided into ten sub-areas to simplify the process of developing alternative service area configurations. Rural Service Area portions of the 201 Planning Area were not considered for the provision of publicly owned wastewater collection systems. Interceptor system alternatives were developed for each of the four service area alternatives in the Draft 201 Alternatives Analysis (October 1, 1982). These systems were screened based on feasibility and costs to select an interceptor configuration for each of the service area alternatives.

During the 201 alternatives screening process, it was decided that the area south of the existing Sand Lake Road Wastewater Treatment Facility (WWTF) service area would be served by developer-built subregional plants because the flows from this area would be from new growth. Based on these decisions, the Sand Lake Road WWTF service area was split into four individual service areas, with newly developing areas to be served by developer-built subregional facilities, i.e. the Peppermill, Vistana and Cypress Walk subregional wastewater treatment facilities. This and the existing Sand Lake Road and McLeod Road facilities service area boundary served to constrain the Sand Lake Road facility service area to the configuration shown on Map II-4.

The Sand Lake Road service area and interceptor requirements are the same for each service area/interceptor alternative. The interceptor improvements are primarily to upgrade existing lines to provide additional capacity. Parallel force mains in two areas and modifications to six pumping stations were found to be necessary to meet future flow requirements. The total projected flow to the Sand Lake Road Treatment Facility would be approximately 23 mgd.

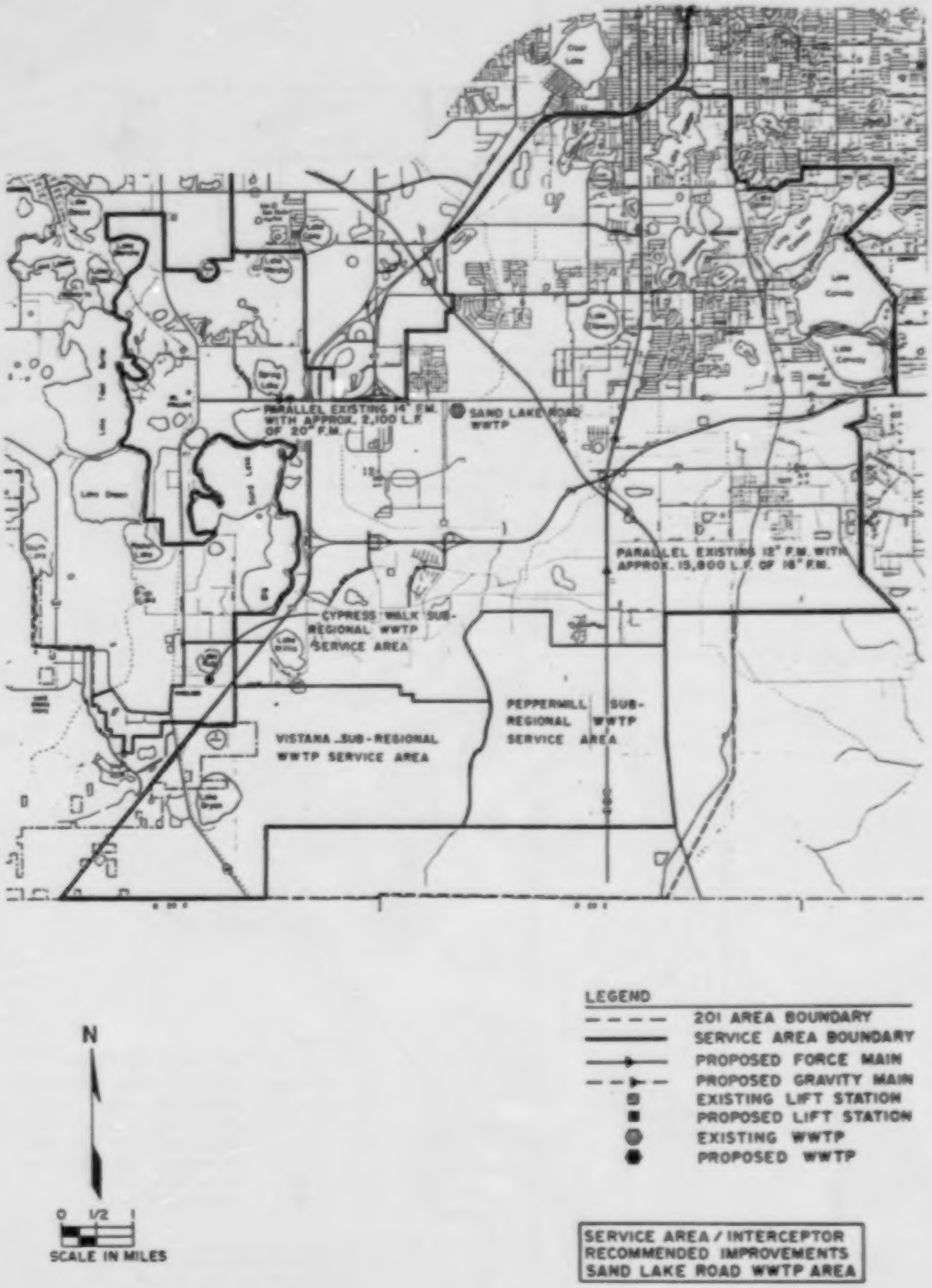
Alternatives for serving the remaining portions of the Urban Service Area involved use of the existing McLeod Road Water Pollution Control Facility (WPCF) and a potential Northwesterly Subregional treatment facility located west of the Clarcona area. The most cost-effective interceptor configuration was determined for each of the four service area alternatives.

For Service Area Alternative 1, the wastewater from the area generally north of Silver Star Road would be routed to the Northwest Subregional Treatment Facility, which would be designed for a projected flow of 5 mgd. The McLeod Road treatment facility would be expanded for a projected Year 2000 flow of 16 mgd and would treat the wastewater from the area generally south of Silver Star Road to the Sand Lake Road service area. Two alternative interceptor routes were developed in the McLeod Road service area for this service area configuration, as shown in Maps II-5 and II-6.

For Service Area Alternative 2, the wastewater flow from the Pine Hills-Orlo Vista area and the area around Lake Orlando would be routed to the Northwest Subregional plant, which would be designed for a projected Year 2000 flow of 10 mgd. The wastewater from these areas is presently treated at the McLeod Road facility. The flow from the remainder of the service area would be routed to the McLeod Road facility, which would remain at its existing capacity and treat a projected flow of 11 mgd. This alternative is presented on Map II-7.

The interceptor system proposed for Service Area Alternative 3 would be similar to the previous alternative, except that the wastewater flow from the area around Lake Orlando (formerly Lake Wekiva) would be routed to the McLeod Road treatment facility. The McLeod Road plant would be designed for a projected flow of 14 mgd while the Northwest plant would be designed for 7 mgd. Except for the area around Lake Orlando, the interceptor system tributary to the Northwest plant would be the same as for Service Area Alternative 2. This alternative is illustrated on Map II-8.

For Service Area Alternative 4, all of the wastewater flow from the northern portion of the 201 Area would be treated at the

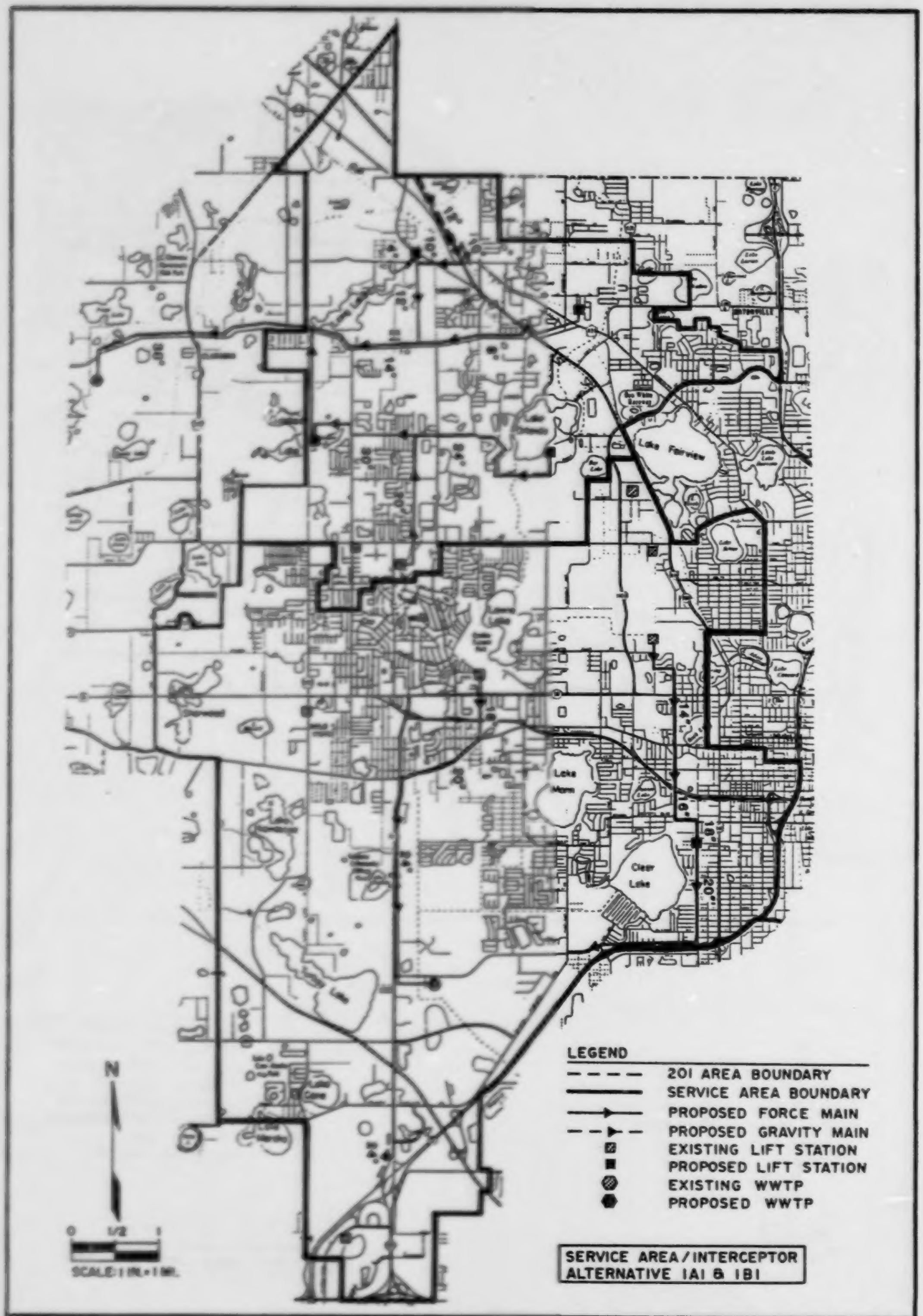

PARALLEL EXISTING 14" F.M. WITH APPROX. 2,100 L.F. OF 20" F.M.
SAND LAKE ROAD WWTP
PARALLEL EXISTING 12" F.M. WITH APPROX. 15,800 L.F. OF 16" F.M.
CYPRESS WALK SUB-REGIONAL WWTP SERVICE AREA
VISTANA SUB-REGIONAL WWTP SERVICE AREA
PEPPERMILL SUB-REGIONAL WWTP SERVICE AREA
N
0 1/2 1
SCALE IN MILES
LEGEND
201 AREA BOUNDARY
SERVICE AREA BOUNDARY
PROPOSED FORCE MAIN
PROPOSED GRAVITY MAIN
EXISTING LIFT STATION
PROPOSED LIFT STATION
EXISTING WWTP
PROPOSED WWTP

SERVICE AREA / INTERCEPTOR
RECOMMENDED IMPROVEMENTS
SAND LAKE ROAD WWTP AREA

MAP II-4

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

PREPARED FOR THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
BY MAYES, SUDDERTH & ETHEREDGE


Lake Fairview
Lake Mann
Clear Lake
16"
20"
N
0
1/2
1
SCALE: 1 IN. = 1 MI.
LEGEND
201 AREA BOUNDARY
SERVICE AREA BOUNDARY
PROPOSED FORCE MAIN
PROPOSED GRAVITY MAIN
EXISTING LIFT STATION
PROPOSED LIFT STATION
EXISTING WWTP
PROPOSED WWTP
SERVICE AREA / INTERCEPTOR
ALTERNATIVE 1A1 & 1B1

MAP III-6

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

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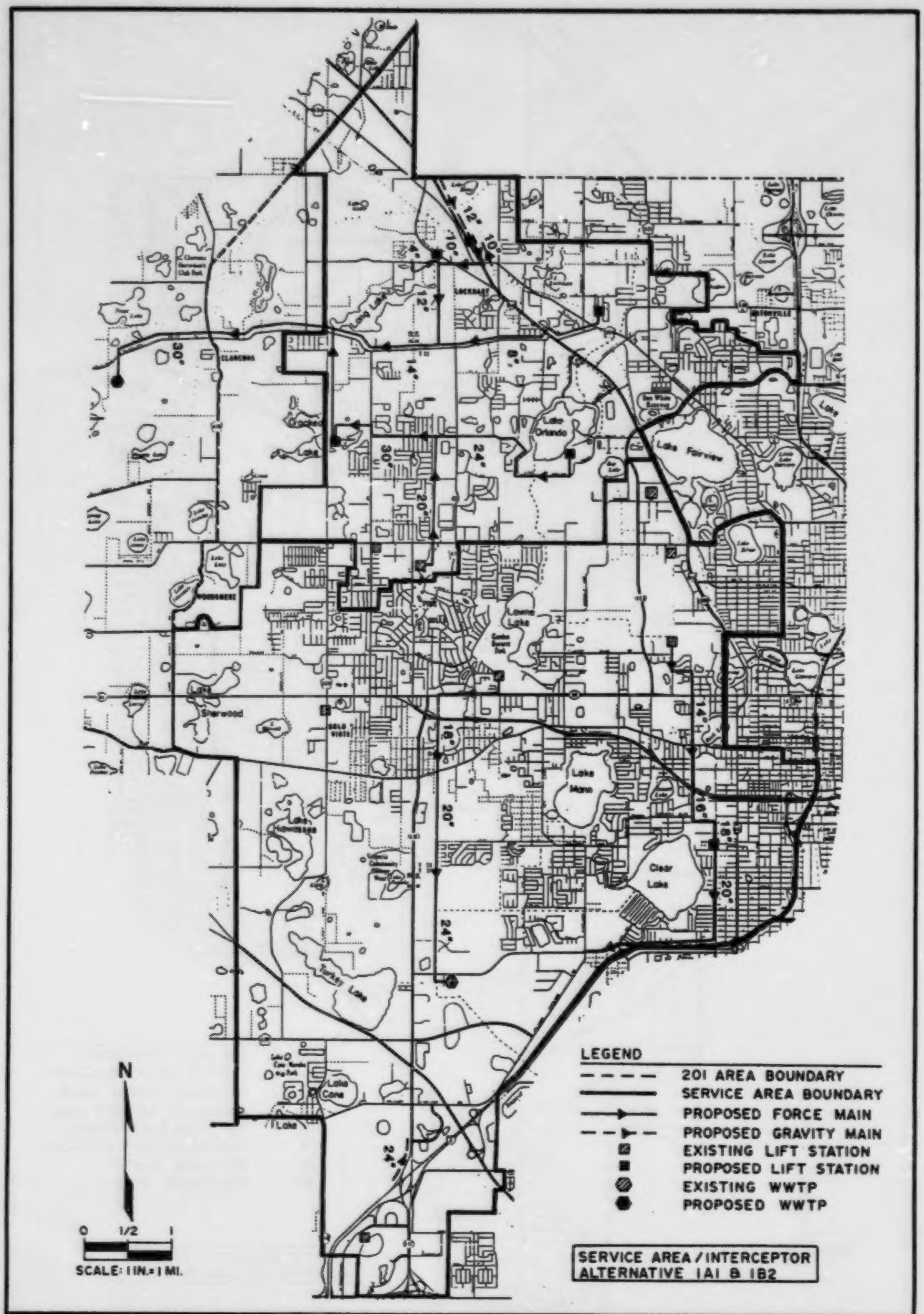
LEGEND
201 AREA BOUNDARY
SERVICE AREA BOUNDARY
PROPOSED FORCE MAIN
PROPOSED GRAVITY MAIN
EXISTING LIFT STATION
PROPOSED LIFT STATION
EXISTING WWTP
PROPOSED WWTP
SERVICE AREA / INTERCEPTOR ALTERNATIVE 1A1 & 1B2
N
0
1/2
1
SCALE: 1 IN.= 1 MI.
Lake Orlando
Lake Fairview
Lake Mann
Clear Lake
Turkey Lake
Lake Sherwood
Lake Hiawassee
Lake Cane
Lawne Lake
Long Lake
CLARCONA
LOCKHART
WOODSMERE
30"
12"
10"
10"
4"
12"
14"
8"
30"
24"
20"
14"
16"
16"
18"
20"
20"
24"
24"

MAP II-6

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

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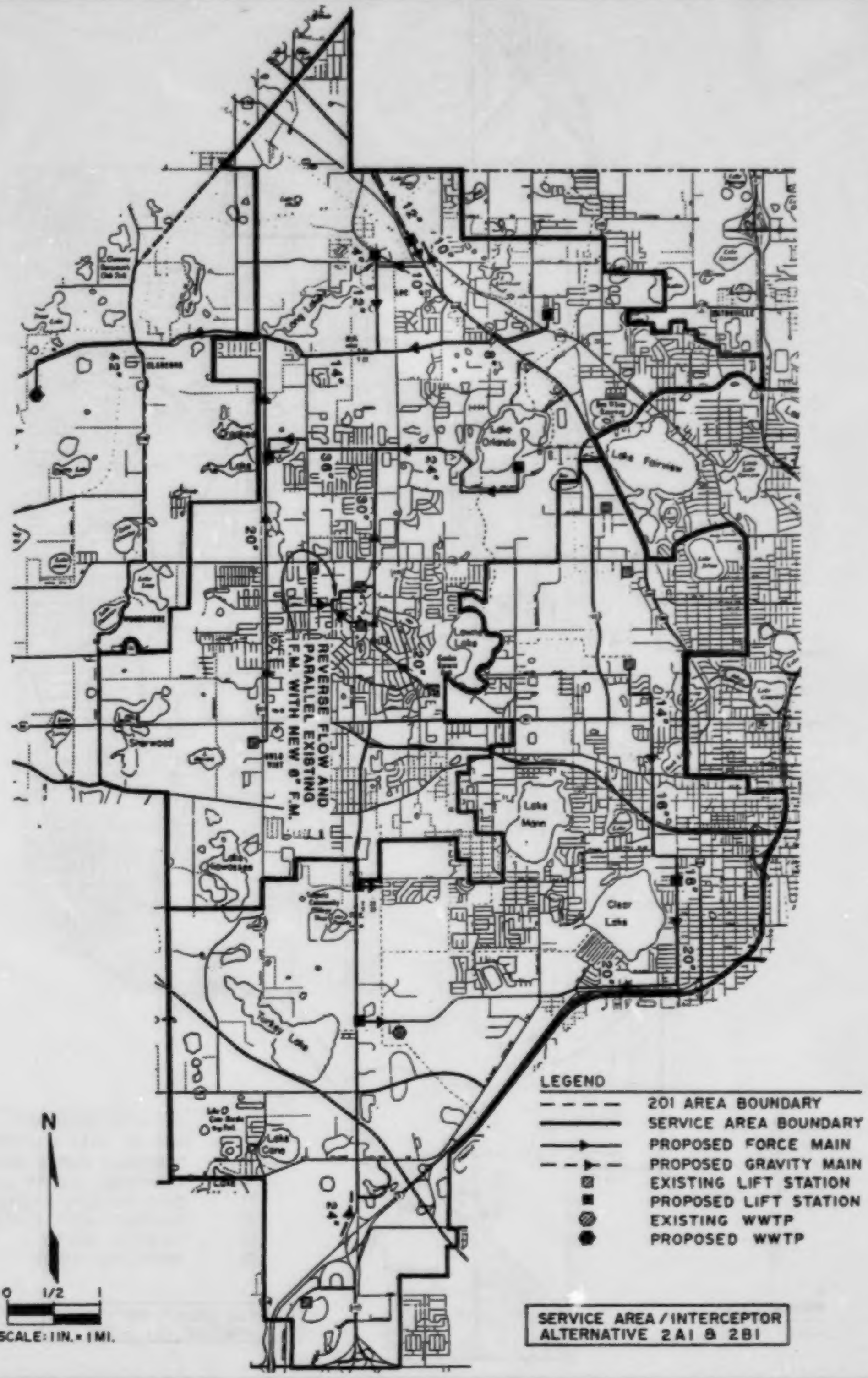

REVERSE FLOW AND PARALLEL EXISTING F.M. WITH NEW 6" F.M.
42"
36"
30"
24"
20"
18"
16"
14"
12"
10"
8"
Lake Orlando
Lake Fairview
Lake Mann
Clear Lake
Turkey Lake
Lake Cane
Sherwood
N
0 1/2 1
SCALE: 1 IN. = 1 MI.
LEGEND
201 AREA BOUNDARY
SERVICE AREA BOUNDARY
PROPOSED FORCE MAIN
PROPOSED GRAVITY MAIN
EXISTING LIFT STATION
PROPOSED LIFT STATION
EXISTING WWTP
PROPOSED WWTP
SERVICE AREA / INTERCEPTOR ALTERNATIVE 2A1 & 2B1

MAP II-7

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

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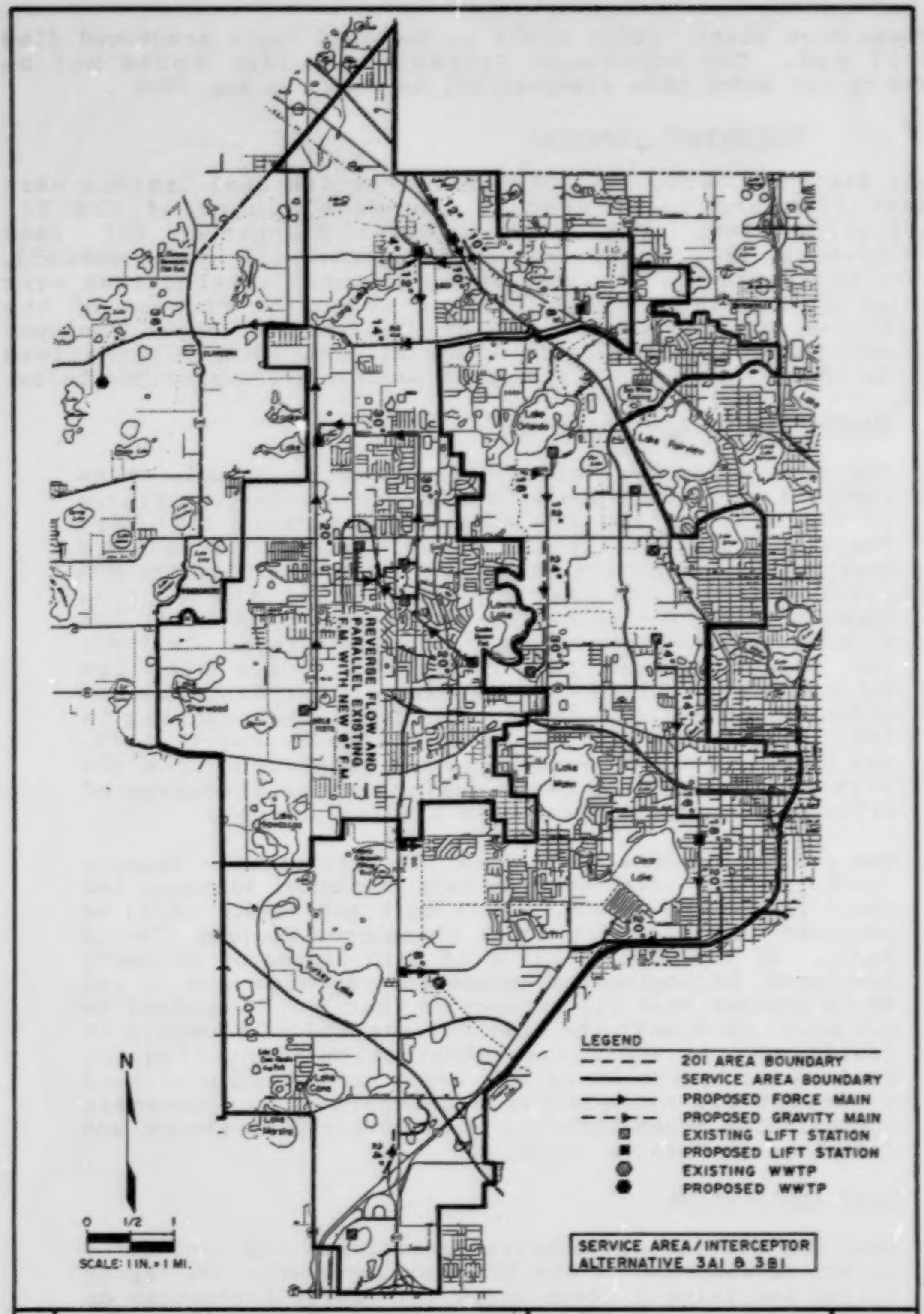

REVERSE FLOW AND PARALLEL EXISTING F.M. WITH NEW 6" F.M.
Lake Fairview
Clear Lake
Turkey Lake
N
0 1/2 1
SCALE: 1 IN. = 1 MI.
LEGEND
201 AREA BOUNDARY
SERVICE AREA BOUNDARY
PROPOSED FORCE MAIN
PROPOSED GRAVITY MAIN
EXISTING LIFT STATION
PROPOSED LIFT STATION
EXISTING WWTP
PROPOSED WWTP
SERVICE AREA/INTERCEPTOR ALTERNATIVE 3A1 & 3B1

MAP II-6

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

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McLeod Road plant, which would be designed for a projected flow of 21 mgd. The Northwest Subregional plant would not be constructed under this alternative, as shown on Map II-9 .

C.2 Wastewater Disposal

Four distinct categories of wastewater disposal options were identified and considered in the development of the 201 Facilities Plan: (1) surface water discharge; (2) land application; (3) groundwater injection and (4) ocean outfall. Using these four categories, seven disposal alternatives were chosen during the initial Phase 1 screening process of the facilities planning program. These alternatives were developed further and evaluated during Phase 2. The seven alternatives within their respective disposal categories are summarized below.

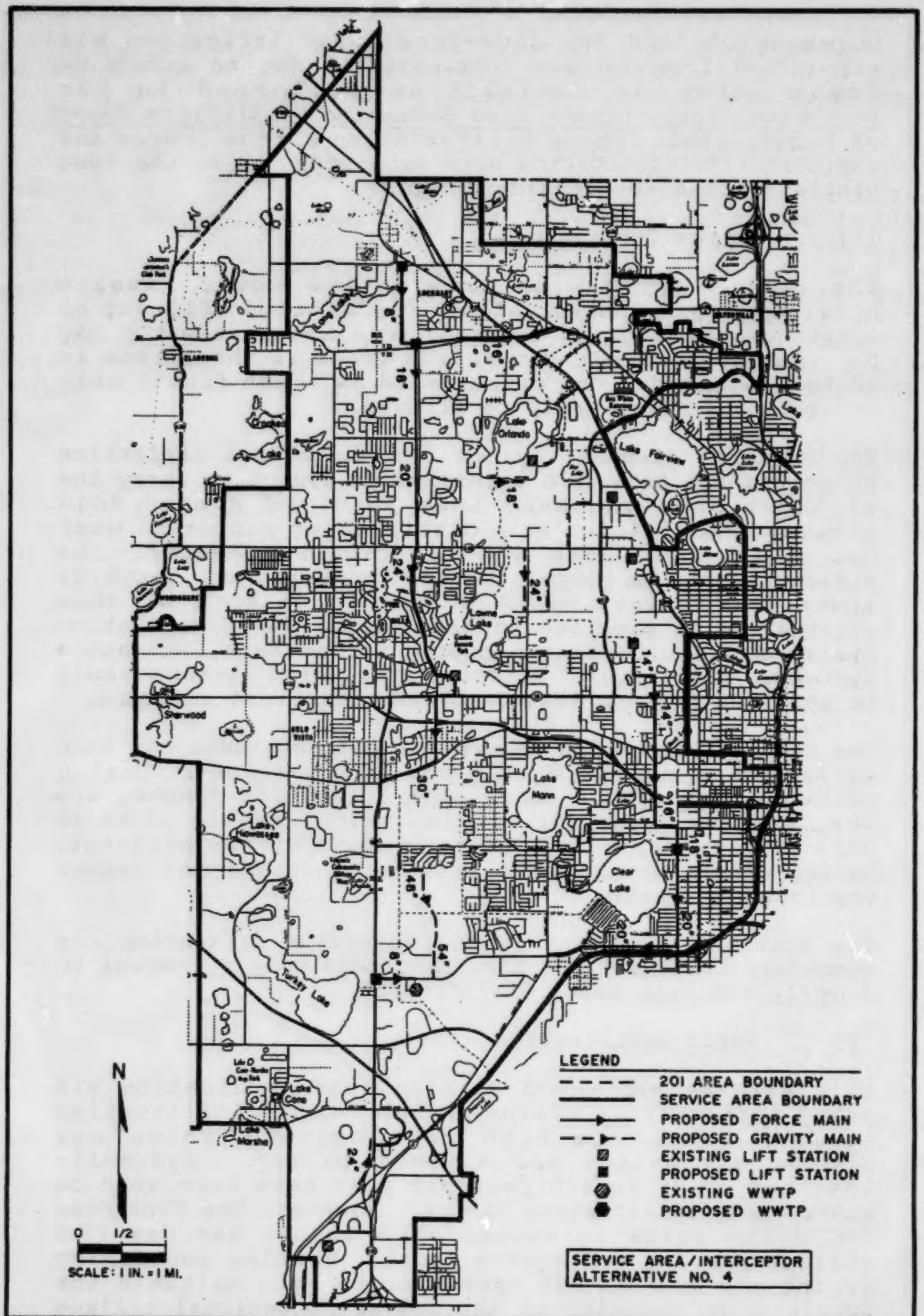
Surface Water Discharge

The alternative of continued discharge to Shingle Creek involved identification of acceptable discharge criteria as described in the EPA Advanced Treatment (AT) Task Force Evaluation. These EPA discharge options were analyzed only from the standpoint of determining the EPA funding level for the project because the Florida Department of Environmental Regulation (FDER) will not permit continued discharges to Shingle Creek. In 1981, the County entered into a consent decree with the U.S.E.P.A., et. al, to cease surface water discharge of effluent to Shingle Creek on a schedule beginning in 1985, and resulting in zero discharge by March, 1988. The City of Orlando entered into a negotiated schedule with FDER, et. al, to cease surface water discharge of effluent to Shingle Creek on a similar schedule.

The evaluation of alternatives for discharge to Shingle Creek involved advanced treatment for total nitrogen and total phosphorus control (TN=3 mg/l and TP=0.2 mg/l) or advanced treatment for total phosphorus control (TP=0.2 mg/l). If the present worth of zero discharge or newly developed biological processes for removing both TN and TP is greater than 115 percent of that for TP control to 0.2 mg/l, then only the cost for removal of TP would be justified. An additional alternative identified for evaluation by the AT review was a combination of land treatment and Shingle Creek discharge; i.e. seasonal agricultural reuse combined with advanced treatment and discharge to Shingle Creek.

Land Application

Land application alternatives identified and considered in the development of the 201 Plan included: (1) spray irrigation using a cover crop; (2) spray irrigation on citrus groves; and (3) rapid infiltration basins. The


Long Lake
Lake Orlando
Lake Fairview
Lawne Lake
Lake Sherwood
Lake Mann
Clear Lake
Turkey Lake
Lake Cane
Lake Marsha
8"
16"
18"
20"
24"
30"
48"
54"
14"
6"
N
0
1/2
1
SCALE: 1 IN. = 1 MI.
LEGEND
201 AREA BOUNDARY
SERVICE AREA BOUNDARY
PROPOSED FORCE MAIN
PROPOSED GRAVITY MAIN
EXISTING LIFT STATION
PROPOSED LIFT STATION
EXISTING WWTP
PROPOSED WWTP

SERVICE AREA / INTERCEPTOR
ALTERNATIVE NO. 4

MAP II-9

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

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purchase of land for slow-rate spray irrigation was eliminated from further consideration due to excessive costs based on evaluations performed in the Southwest Orange County Land Spreading Feasibility Report of March, 1981. Spray irrigation on citrus groves and rapid infiltration basins were determined to be the most viable options for consideration.

(1) Citrus Irrigation

The citrus irrigation alternative would involve distributing filtered, highly disinfected effluent to citrus groves. Highly treated reclaimed wastewater may be used on, over or under citrus trees if the citrus is to be processed. For citrus sold as fresh fruit, only under-tree systems would be allowed.

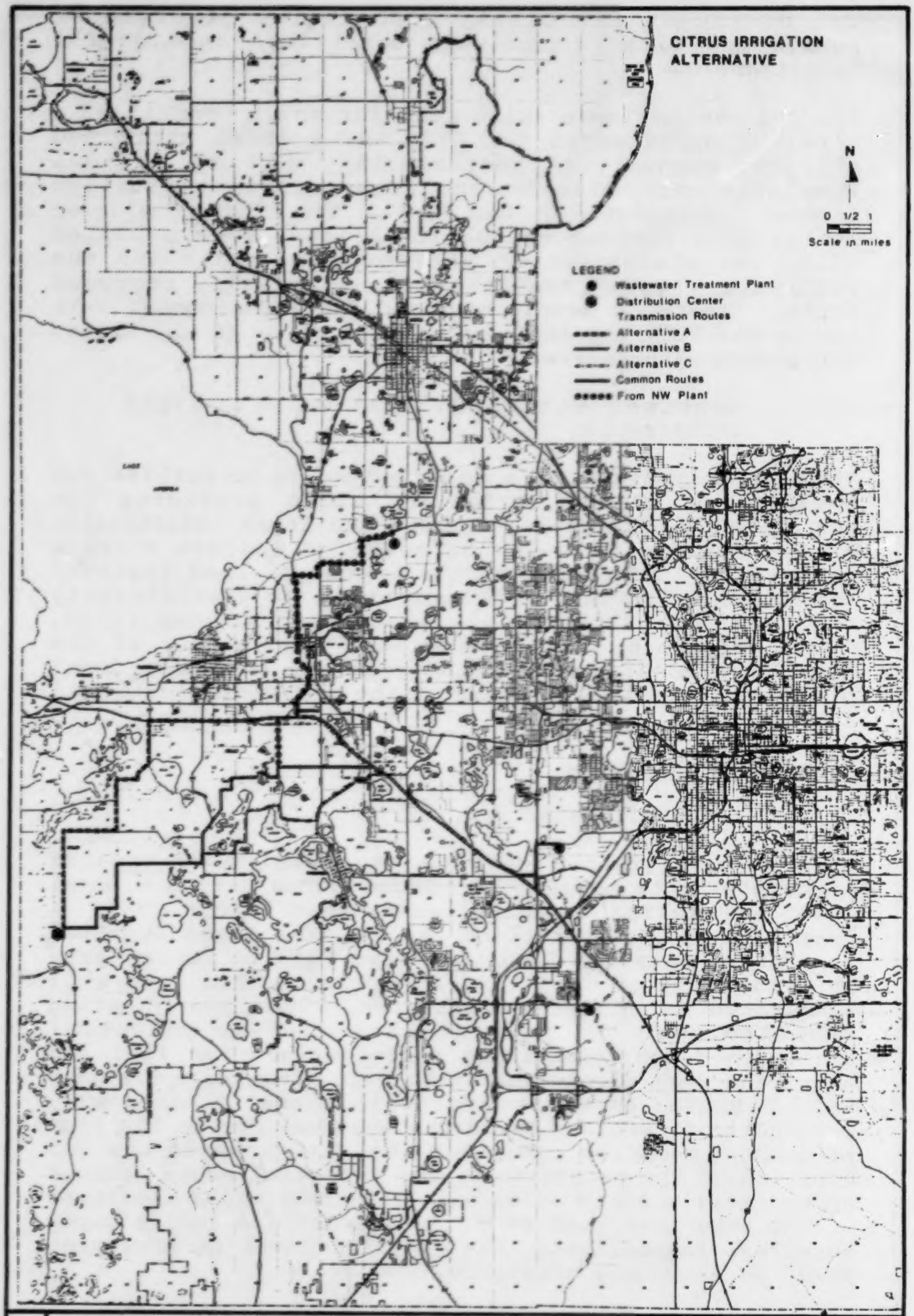
The effluent disposal system for the citrus irrigation program would include a transmission system to carry the effluent from the Sand Lake Road and McLeod Road treatment facilities to a distribution center in west Orange County. From the distribution center, the effluent would be pumped to the citrus growers' property lines for irrigation. A schematic diagram of this alternative is provided in Map II-10. The distribution system would not provide piping for on-farm irrigation systems. The growers' existing irrigation systems would be utilized for application of the reclaimed effluent.

The average irrigation demand for citrus groves has been estimated at approximately one inch per week. During certain times of the year, when irrigation demands are low, storage areas for holding approximately 30 to 90 days of flow may be needed to contain excess effluent. During other periods, the irrigation demand may exceed one inch per week.

The required treatment level for citrus irrigation is secondary treatment for BOD, suspended solids removal to 5 mg/l, and high level disinfection.

(2) Rapid Infiltration

This alternative would utilize land application via rapid infiltration basins (RIBs). Rapid infiltration basins (RIBs) are high rate systems which are alternately wetted and allowed to dry. Hydraulic loadings of 20 to 400 feet per year have been used on other rapid infiltration basins. However, the FDER does not allow rates in excess of 9 inches per day (5.6 gallons per day per square foot). Wetting and drying cycles are used in RIB operation to help maintain the infiltration capacity of the soils. Occasional tillage is also required to restore the infiltration capacity of the surface layer soils. This land application method


CITRUS IRRIGATION ALTERNATIVE
N
0 1/2 1
Scale in miles
LEGEND
● Wastewater Treatment Plant
● Distribution Center
Transmission Routes
Alternative A
Alternative B
Alternative C
Common Routes
From NW Plant

MAP II-10

**ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN**

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ENVIRONMENTAL PROTECTION AGENCY
BY MAYES, SUDDERTH & ETHEREDGE

can provide a relatively high degree of effluent renovation with proper site conditions and careful operation.

The 201 evaluation of site specific soils identified a total of 4,260 acres for RIBs and a total estimated effluent capacity of approximately 43.1 mgd. Sites identified for RIBs in the alternatives evaluation process are depicted on Map II-11. The sites considered in the alternatives evaluation process were modified after the evaluation of alternatives. This and the following chapter evaluates the originally proposed sites. Treatment levels required for RIB disposal were set by the FDER and are identical to those of the citrus irrigation alternative.

(3) Combined Citrus Irrigation - Rapid Infiltration

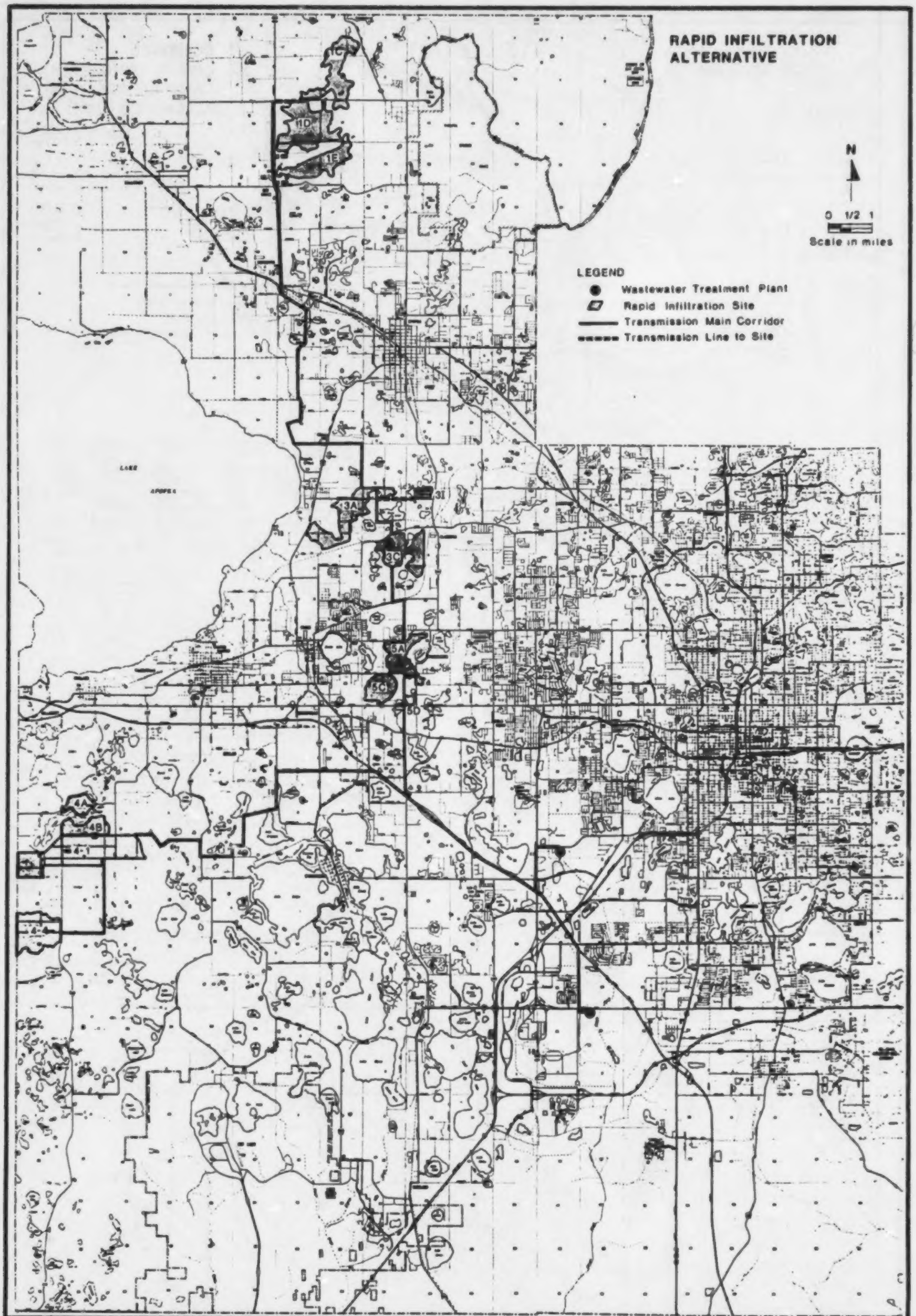
These alternatives were combined so as to utilize the benefits of citrus irrigation while providing for variations in irrigation needs. The rapid infiltration basins would eliminate the need for surface storage reservoirs. In addition, the amount of land required for rapid infiltration basins would be significantly reduced. This alternative illustrated in Map II-12, would provide greater flexibility than either of the individual alternatives. The required treatment level would be identical to those of the individual disposal alternatives.

Groundwater Injection

(1) Deep Well Injection

Deep well injection entails the pumping of treated wastewater into nonpotable aquifer zones having a total dissolved solids content greater than 10,000 mg/l. A deep test well was drilled in 1977 to a total depth of 6,193 feet near the Sand Lake Road WWTF to investigate the viability of deep well injection. This test well terminated in dense basement rock. Subsequent testing revealed that the permeability of deep potential injection zones (containing saline water) was low, and the zones were highly susceptible to plugging. The deep well disposal of wastewater within the 201 Area was, therefore, determined to be uneconomical due to the high pressures required. Further analysis outside the 201 Area led to the selection of two potential areas located approximately forty miles east and sixty miles southeast of the Sand Lake Road WWTF, in Brevard and Indian River Counties, respectively. The required level of treatment would be secondary treatment.

(2) Groundwater Conservation


RAPID INFILTRATION ALTERNATIVE
N
0 1/2 1
Scale in miles
LEGEND
● Wastewater Treatment Plant
▱ Rapid Infiltration Site
Transmission Main Corridor
Transmission Line to Site
LAKE APOPKA
1D
1E
3A
3C
5A
5C
4A
4B

MAP II-11

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

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ENVIRONMENTAL PROTECTION AGENCY
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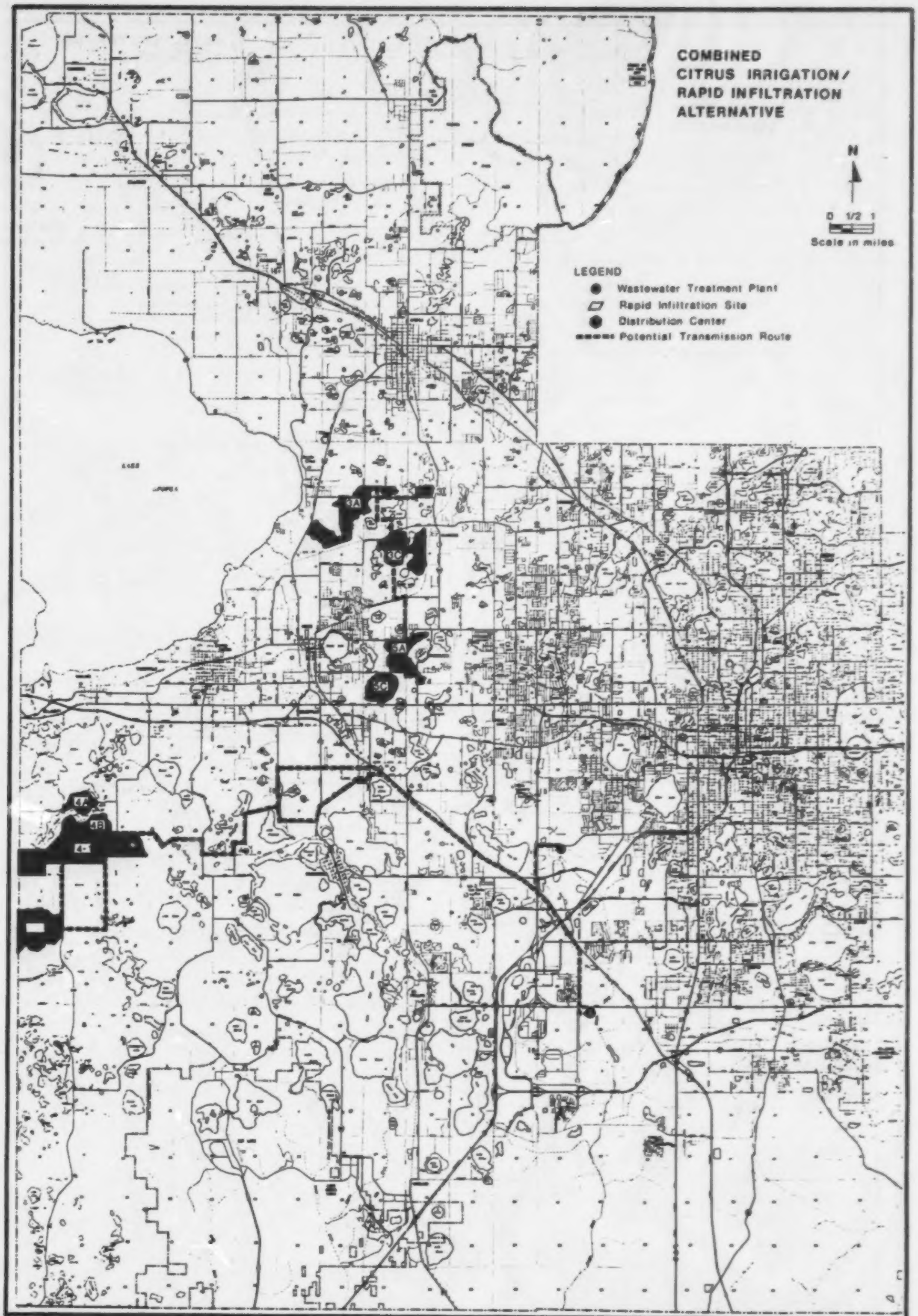
COMBINED CITRUS IRRIGATION/ RAPID INFILTRATION ALTERNATIVE
N
0 1/2 1
Scale in miles
LEGEND
● Wastewater Treatment Plant
▱ Rapid Infiltration Site
● Distribution Center
▬ ▬ ▬ Potential Transmission Route
LAKE
APOPKA
1A
3C
5A
5C
4A
4B
4C

MAP II-12

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
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Shallow well injection of highly treated wastewater into the potable Floridan aquifer was also considered in the 201 Plan under the Groundwater Conservation Program (GCP). In Orange County, the Floridan aquifer generally consists of two zones. The lower zone is the primary producing zone where the major water supply wells obtain their supply. About 400 existing storm water drainage and lake level control wells discharge into the upper zone of the aquifer. This zone was selected as the receiving zone for this alternative.

Existing data and regulations associated with the discharge of highly treated effluent into the groundwater were reviewed extensively. Some of the existing data evaluated included hydrogeologic features, water quality, existing drainage and supply well samples. Sampling and testing programs were performed on existing wastewater influent and effluent, as well as in the lower and upper zones of the aquifer. Unit treatment processes and potential treatment methods were analyzed for cost effectiveness.

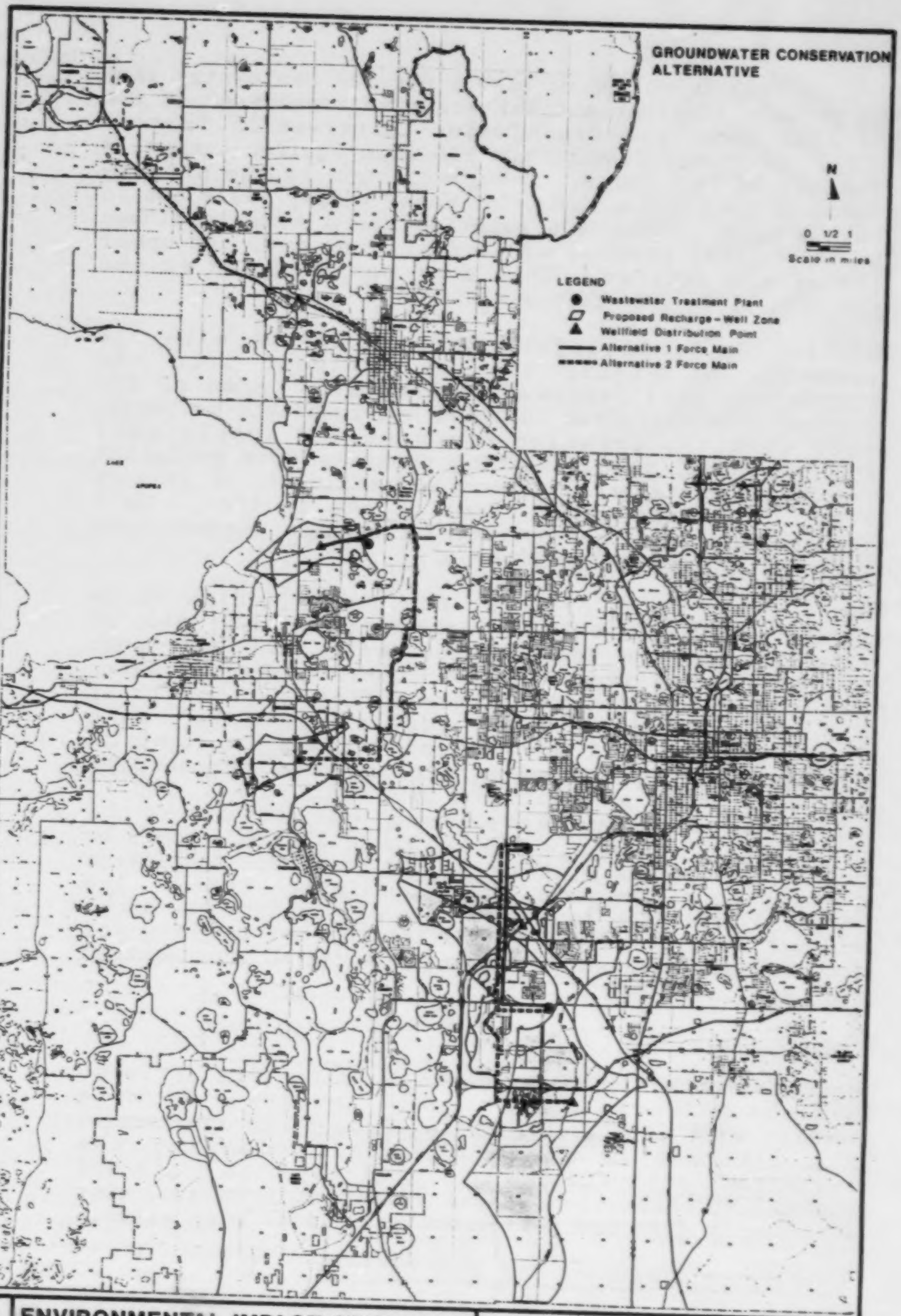
Preliminary design criteria for the injection wells included: a linear well configuration; consideration of water table buildup from adjacent wells; maximum upper zone pressure buildup of 20 feet of water; maximum water table elevation buildup of 15 feet; flow equalization at the treatment plant for constant pumping rate capabilities; well spacing of 1,000 feet; and an allowance of 100 feet of controlled area surrounding each well (i.e. a wellfield 200 feet wide). Total wellfield area required was estimated to be approximately 103 to 112 acres. The wellfields would be located as close as possible to the treatment facilities in order to minimize water transmission costs. The potential injection zones for this alternative are shown on Map II-13. Advanced treatment to meet primary and secondary drinking water standards would be the required treatment level for this alternative.

Ocean Outfall

Construction of an ocean outfall, directing effluent into the Atlantic Ocean, would involve a 68 mile pipeline with pipe sizes ranging from 66 to 108 inches. This alternative was eliminated following the preliminary analysis due to relatively high costs and complex implementation issues resulting from the wide variation in flow and correspondingly large pipe sizes.

C.3 Wastewater Treatment Facility Options

There were three wastewater treatment facilities evaluated for the Southwest Orange County 201 Facility Plan. The Sand Lake


N
0 1/2 1
Scale in miles
LEGEND
● Wastewater Treatment Plant
▱ Proposed Recharge – Well Zone
▲ Wellfield Distribution Point
—— Alternative 1 Force Main
▬▬ Alternative 2 Force Main

GROUNDWATER CONSERVATION ALTERNATIVE

MAP II-13

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

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Road Wastewater Treatment Facility (WWTF) is situated east of Interstate 4 on Sand Lake Road adjacent to the Martin-Marietta industrial complex. The McLeod Road Water Pollution Control Facility (WPCF) is located to the east of State Road 435 and south of McLeod Road. The proposed Northwest Subregional WWTF was to be located west of the Clarcona area. Proposed developer-built subregional facilities will be located south of the Sand Lake Road WWTF service area.

Wastewater treatment alternatives were developed for each of the feasible combined service area/interceptor and wastewater disposal options. Five basic treatment levels were considered: (1) secondary; (2) secondary followed by filtration and high level disinfection (3) secondary with nitrification, denitrification and phosphorus removal to 0.2 mg/; (4) secondary with phosphorus removal to 0.2 mg/l; and (5) advanced treatment. These treatment levels are related to the method of disposal and are included in the summaries of each of the disposal alternatives.

Wastewater treatment unit process alternatives were developed for each of the above mentioned treatment levels. The least cost treatment alternative was selected from a present worth analysis for each effluent requirement.

C.4 Sludge Treatment/Disposal

The amount of solids produced by each of the alternatives associated with the Sand Lake Road, McLeod Road and Northwest Subregional facilities are detailed in Table II-1. Depending on the wastewater treatment process selected, the sludge will be primary plus either biological and/or chemical. Chemical sludges would be produced only with those alternatives associated with surface water discharge because of the lime treatment required to remove phosphorus. Sludge process alternatives evaluated include a combination of thickening, stabilization, conditioning and dewatering.

The least cost sludge processing method for wastewater treatment alternatives at the Sand Lake Road and Northwest facilities is centrifuge thickening of the biological waste activated sludge followed by anaerobic digestion and dewatering by a belt filter press. The least cost method for the lime sludge would be gravity thickening followed by vacuum filter dewatering.

The least cost organic sludge processing method for the McLeod Road WPCF would depend on its design flow. For design flows of 15.5 mgd and 20.5 mgd, gravity thickening of primary sludge, centrifuge thickening of secondary sludge, anaerobic digestion of thickened sludges and dewatering of digested sludge using a belt filter press would be the preferred treatment train. At flows of 10.9 mgd and 13.7 mgd, the least cost processing method would be centrifuge thickening of secondary sludge and dewatering of digested sludge using belt filters. For inorganic sludge, the least cost method for all flows includes sludge storage and

TABLE II-1

QUANTITY OF SOLIDS PRODUCED AT PROPOSED TREATMENT FACILITIES[1]

LIQUID TREATMENT PROCESS LEVEL	SAND LAKE ROAD WWTF[2]	MCLEOD ROAD WWTF				NORTHWEST SUBREGIONAL WWTF		
		S.A.Alt. 1[3] (15.5 mgd)	S.A.Alt.2 (10.2 mgd)	S.A.Alt.3 (13.7 mgd)	S.A.Alt.4 (60.5 mgd)	S.A.Alt.1 (5.0 mgd)	S.A.Alt.2 (6.0 mgd)	S.A.Alt.3 (9.6 mgd)
Secondary	46,000	28,000	21,000	24,500	56,900	10,000	13,600	15,000
Secondary + Filtration	47,050	28,000	21,000	24,500	58,900	10,200	13,900	15,650
Secondary w/Nitrification/ Denitrification + P (0.2 mg/l)	136,000	133,200	98,200	104,400	174,000	29,550	40,200	57,750
Secondary + P (0.2 mg/l)	176,200	127,400	85,700	101,400	168,500	35,300	52,100	73,500
Advanced Treatment	34,000	43,600	23,000	26,000	57,200	7,400	10,000	14,200

[1] Least cost alternatives for specified levels of solids processing/disposal (all quantities in lbs. dry solids/day).

[2] Quantity of solids produced at the Sand Lake Road WWTF is the same for all service area alternatives.

[3] Service Area alternative.

Source: Southwest Orange County, Florida
201 Facilities Plan, Draft; October, 1983;
Tables 5-5,5-6,5-7

56<

dewatering by vacuum filtration.

Several sludge disposal options were considered: (1) landfill; (2) incineration/landfill; (3) co-incineration/landfill; (4) landspread; (5) heat dry/market; and (6) compost/market. Of these, landfill at the Orange County Model Sanitary Landfill was chosen as the least cost method.

C.5 On-Lot Treatment/Disposal Alternatives

Several alternatives were considered for on-site and small system treatment methods. These include (1) septic tanks and drain fields; (2) intermittent sand filters; (3) aerobic treatment units; (4) disinfection units; and (5) wastewater segregation and recycle systems.

The septic tank option was the only alternative evaluated in detail in the 201 Plan. This was because septic tank systems are widely used, have cost advantages over other on-lot systems, and are traditionally accepted in the area. It was determined that up to 2.3 mgd of the projected wastewater flow from the Urban Service Area could be treated by septic tanks. This was based on serving low density residential development located in suitable soil conditions within the Urban Service Area. The remaining wastewater flows in the Urban Service Area would be collected, treated and disposed of via centralized systems. Treatment and disposal would be accomplished using the combined citrus irrigation/rapid infiltration alternative.

C.6 No Federal Action Alternative

The no federal action alternative would involve the use of septic tanks and locally funded subregional treatment facilities to treat the projected wastewater flow in excess of the existing design capacities at the Sand Lake Road and McLeod Road treatment facilities. The combined citrus irrigation/rapid infiltration alternative would be used for disposal of the effluent from the Sand Lake Road, McLeod Road and subregional treatment facilities. In this alternative, all of the proposed improvements would be funded locally with no federal grant participation.

Septic tanks would be used for wastewater disposal for projected low density residential development in the Urban Service Area. A total of 12,169 new septic tank systems were considered feasible in the Urban Service Area. The areas chosen were based on soils with high or medium potential for septic systems, as well as the distance from a centralized collection system. Approximately 2.3 mgd of the projected Year 2000 wastewater flow could be accommodated by septic tanks. The remainder of the flow would be collected and treated at the existing treatment plants or at the new subregional treatment facilities.

The Sand Lake Road and McLeod Road treatment facilities would be allowed to reach their existing flow capacities of 15 and 13 mgd, respectively. Both plants would provide secondary treatment followed by filtration and high level disinfection. The effluent would be pumped through a common transmission line to the distribution center in west Orange County, as proposed for the combined citrus irrigation/rapid infiltration alternative. The Northwest Subregional Treatment Facility would be constructed to provide secondary treatment plus filtration and high level disinfection for a design flow of 6 mgd, and the effluent would be disposed of by rapid infiltration in the vicinity of the facility. A subregional treatment facility would be constructed at the site of the existing Orangewood Pumping Station, south of the Sand Lake Road facility, to provide a similar treatment level for a design flow of 7 mgd. The effluent would be pumped through an existing force main to the Sand Lake Road WWTF where it would be repumped along with the Sand Lake Road Plant effluent to west Orange County for disposal by citrus irrigation/rapid infiltration.

Approximately 25 mgd of the filtered and disinfected effluent from the Sand Lake Road, McLeod Road and Orangewood treatment facilities would be routed to the citrus irrigation distribution system, as proposed for the combined citrus irrigation/rapid infiltration alternative. The remainder of the effluent (about 10 mgd) would be disposed of by rapid infiltration basins located in the western part of Orange County.

D. IDENTIFICATION OF AVAILABLE NONSTRUCTURAL ALTERNATIVES

Nonstructural alternatives include land use and development controls, water conservation measures, and changes in operational practices of the existing treatment plants.

D.1 Land Use and Development Controls

The Orange County Growth Management Policy was developed to guide growth in the unincorporated areas of the County. One of the most important aspects of this growth guide was the designation of the Urban and Rural Service Areas. The County adopted policies regarding the level of public services which would be provided within these geographical areas. Services normally provided to urban areas, such as centralized water supply and sewer services, are to be provided only in the Urban Service Area. Development in the Rural Service Area would rely on individual systems or developer financed and operated systems. The policy's intent is to support the Land Use Policy Guide which advocates encouraging generally high density development in the Urban Service Area while discouraging high density development in the Rural Service Area. Minimizing the costs of providing urban services is the goal of this policy.

Based on the policies and goals of the Orange County Growth Management Policy, the Southwest Orange County 201 Facilities Plan was developed to serve only the Urban Service Area portion of the 201 Planning Area. The Rural Service Area would not be provided publicly-owned centralized sewer service. This nonstructural alternative is an integral component of the entire 201 Facilities Planning process.

In addition to the above, the Orange County Growth Management Policy contains policies which have as their goal the orderly extension of public services to undeveloped portions of the Urban Service Area. These policies include provisions for the development of 5-year capital improvements plans for the expansion of water and sewer systems. Development which occurs outside of the planned system expansions requires constructing and financing interim facilities, or assisting in the financing of system extensions which are not included in the 5-year capital improvements plan. Implementation of these policies minimizes the economic impact to the County and serves to effectively guide growth.

D.2 Water Conservation Measures

In Orange County, it is estimated that water conservation measures could reduce wastewater flows by 2 to 3 mgd, with the majority of the reduction coming from residential users in new homes. In the City of Orlando, the estimated reduction in flow could be 750,000 gallons, with 500,000 gallons coming from residential users in new homes and 250,000 gallons coming from industrial users. Each new home could utilize limiting flow shower heads, faucet aerators, and toilet volume displacement. Reduction in wastewater due to retrofitting in existing homes is considered insignificant. The majority of the wastewater coming from the industries in the City of Orlando consists of process, cooling and boiler feed water. The 250,000 gallon reduction in flow occurs by diverting the essentially unpolluted cooling and boiler feed water discharges to storm sewers. This method may not be cost-effective due to the extensive piping modifications and possible cooling pond requirements. An alternative to diversion is recycling and reuse of the cooling and boiler feed system water. The implementation of this alternative has the advantage of reducing industrial water requirements, resulting in lower operating costs.

D.3 Optimum Use of Existing Wastewater Facilities

Various nonstructural alternatives were evaluated in the 201 Plan for each of the existing treatment plants. All of the treatment plant alternatives considered utilize the existing treatment facilities. The 201 Plan evaluated modifications that would utilize the existing treatment units as much as possible. The purpose of these modifications was to reduce costs by making optimum use of the existing facilities. In addition to the above, the proposed elimination of excessive infiltration and inflow into the existing collection systems will make it possible to make optimum use of capacities in existing collector and interceptor sewers, and reduce hydraulic loadings to the treatment facilities.

E. COST EVALUATION

E.1 Methodology

The four service area/interceptor alternatives were combined with treatment (liquid and solids) and effluent disposal alternatives into 28 complete systems. Table II-2 provides the present worth costs of the 28 systems using capital, operation, maintenance and replacement costs. The present worth analysis is assumed to be sensitive to within 10%. Therefore, alternatives with a present worth within 10% of the least cost alternative are considered to have equivalent costs.

E.2 Alternative Costs

A present worth analysis of the 28 alternative systems yielded eight combined systems within 10% of the least cost alternative. These eight systems are listed in Table II-3. The alternatives consist of either the two or three plant option, with effluent disposal via rapid infiltration basins or combined citrus irrigation/rapid infiltration basins.

The present worth cost of the septic tank and small community systems alternative is detailed in Table II-4. Table II-5 depicts the present worth analysis of the no federal action alternative. Individual on-site and small community systems were determined to be less cost-effective than the selected alternative.

F. OPERABILITY/IMPLEMENTABILITY EVALUATION

Operability addresses the ease of operating a particular system. Items considered in the evaluation are special control systems, number of operations, personnel and sophisticated treatment systems. Implementation refers to the ability of governmental agencies and other affected parties to agree upon and implement the selected alternative.

The 201 Draft Alternative Analysis (October 1, 1982) evaluates the rapid infiltration and combined citrus irrigation-rapid infiltration methods using two plant and three plant alternatives. This evaluation is provided in Table II-6. In addition to the above criteria, reliability and flexibility are also taken into consideration. These factors consider how dependable an alternative is in maintaining treatment and disposal objectives, and how flexible it is with regard to

TABLE II-2*

ALTERNATIVES COST ANALYSIS

(MILLION DOLLARS)

COLLECTION COSTS

ALT.	McLEOD ROAD			SAND LAKE ROAD			SUBREGIONAL			TOTAL		
	CAP.	O&M	P.W. (1)	CAP.	O&M	P.W. (1)	CAP.	O&M	P.W. (1)	CAP.	O&M	P.W. (1)
1	9.12	.28 15.5 MGD	10.82	2.96	.09 22.6 MGD	3.57	13.56	.24 5.0 MGD	14.62	25.64	.61 43.1 MGD	29.01
2	6.61	.23 10.9 MGD	8.12	2.96	.09 22.6 MGD	3.57	21.39	.37 9.6 MGD	29.95	30.96	.69 43.1 MGD	34.64
3	9.68	.34 13.7 MGD	11.96	2.96	.09 22.6 MGD	3.57	16.67	.26 6.8 MGD	17.63	29.31	.69 43.1 MGD	33.16
4	19.88	.48 20.5 MGD	22.37	2.96	.09 22.6 MGD	3.57	—	— —	—	22.84	.57 43.1 MGD	25.94

TREATMENT/SLUDGE COSTS

ALT.	LEVEL (2)	McLEOD ROAD			SAND LAKE ROAD			SUBREGIONAL			TOTAL		
		CAP	O&M	P.W. (1)	CAP.	O&M	P.W. (1)	CAP.	O&M	P.W. (1)	CAP.	O&M	P.W. (1)
1	A	11.59	1.18	22.60	11.04	2.02	30.88	8.81	.48	13.14	31.44	3.68	66.62
1	B	11.59	1.18	22.60	11.04	2.02	30.88	8.81	.48	13.14	31.44	3.68	66.62
1	C	16.38	1.44	29.86	17.34	2.51	41.62	11.41	.67	17.38	45.33	4.62	88.86
1	D	11.02	1.02	20.49	10.44	1.79	28.10	8.81	.48	13.14	30.27	3.30	61.73
1	E	50.34	4.74	95.59	45.13	4.56	88.79	17.13	1.56	31.96	112.60	10.86	216.34
1	F	37.29	3.65	72.45	39.65	4.53	83.78	17.26	1.03	26.73	94.20	9.21	182.46
1	G	36.91	5.79	92.76	53.72	8.47	129.58	24.42	2.58	48.71	115.05	16.84	271.05
2	A	2.10	.68	9.00	11.04	2.02	30.88	14.83	.80	21.96	27.97	3.50	61.84
2	B	2.10	.68	9.00	11.04	2.02	30.88	14.83	.80	21.96	27.97	3.50	61.84
2	C	6.31	.91	15.21	17.34	2.51	41.62	17.93	1.14	28.31	41.58	4.56	85.14
2	D	2.10	.68	9.00	10.44	1.79	28.10	14.83	.80	21.96	27.37	3.27	59.06
2	E	31.76	3.54	66.12	45.13	4.56	88.79	27.77	2.79	54.46	104.66	10.89	209.37
2	F	22.31	2.64	46.47	39.65	4.53	83.78	29.15	2.02	48.05	91.31	9.19	180.30
2	G	21.68	4.17	62.36	53.72	8.47	129.58	39.50	4.48	81.91	114.90	17.12	273.84
3	A	5.93	.98	15.45	11.04	2.02	30.88	11.54	.63	17.18	28.51	3.63	63.51
3	B	5.93	.98	15.45	11.04	2.02	30.88	11.54	.63	17.18	28.51	3.63	63.51
3	C	10.71	1.23	22.46	17.34	2.51	41.62	14.19	.87	22.03	42.24	4.61	86.11
3	D	5.76	.82	13.73	10.44	1.79	28.10	11.54	.63	17.18	27.74	3.24	59.01
3	E	38.57	4.14	79.57	45.13	4.56	88.79	22.12	2.11	42.24	106.82	10.81	210.60
3	F	29.11	3.16	58.87	39.65	4.53	83.78	22.89	1.53	37.13	91.65	9.22	180.78
3	G	28.09	5.08	77.20	53.72	8.47	129.58	30.05	3.52	62.70	111.86	17.04	269.48
4	A	16.62	1.63	32.14	11.04	2.02	30.88	—	—	—	27.66	3.65	63.02
4	B	16.62	1.63	32.14	11.04	2.02	30.88	—	—	—	27.66	3.65	63.02
4	C	22.74	1.97	41.12	17.34	2.51	41.62	—	—	—	40.08	4.48	82.74
4	D	15.89	1.41	28.82	10.44	1.79	28.10	—	—	—	26.33	3.20	56.92
4	E	63.83	6.21	123.82	45.13	4.56	88.79	—	—	—	108.96	10.77	212.61
4	F	49.15	4.79	95.43	39.65	4.53	83.78	—	—	—	88.80	9.32	179.21
4	G	56.25	6.94	122.36	53.72	8.47	129.58	—	—	—	109.97	15.41	251.94

DISPOSAL COSTS

ALT.	LEVEL (2)	TYPE	McLEOD ROAD			SAND LAKE ROAD			SUBREGIONAL			TOTAL			TOTAL ALT. NO.	TOTAL ALTERNATIVE COSTS		
			CAP.	O&M	P.W. (1)	CAP.	O&M	P.W. (1)	CAR	O&M	P.W. (1)	CAP.	O&M	P.W. (1)		CAP.	O&M	P.W. (1)
1	A	DEEP WELL	→	→	→	→	→	→	→	→	→	110.50	2.49	127.74	1A	167.58	6.78	223.37
1	B	RAPID INFL.	→	→	→	→	→	→	→	→	→	73.53	1.09	68.46	1B	130.61	5.38	164.09
1	C	CITRUS	→	→	→	→	→	→	→	→	→	60.53	1.79	70.89	1C	131.50	7.02	188.76
1	D	CITRUS /R.I.	→	→	→	→	→	→	→	→	→	70.07	2.08	80.61	1D	125.98	5.99	171.35
1	E	SURFACE (N/P)	0	0	0	0	0	0	—	—	—	0	0	0	1E	138.24	11.47	245.35
1	F	SURFACE (P)	0	0	0	0	0	0	—	—	—	0	0	0	1F	119.84	9.82	211.47
1	G	GCP	→	→	→	22.94	2.55	47.35	2.87	.36	6.35	25.85	2.91	53.70	1G	166.54	20.36	353.76
2	A	DEEP WELL	→	→	→	→	→	→	→	→	→	110.50	2.49	127.74	2A	169.43	6.68	224.22
2	B	RAPID INFL.	→	→	→	→	→	→	→	→	→	71.10	1.11	66.60	2B	130.03	5.30	163.08
2	C	CITRUS	→	→	→	→	→	→	→	→	→	60.09	1.80	71.55	2C	132.63	7.05	191.33
2	D	CITRUS /R.I.	→	→	→	→	→	→	→	→	→	68.95	2.20	80.63	2D	127.28	6.16	174.33
2	E	SURFACE (N/P)	0	0	0	0	0	0	—	—	—	0	0	0	2E	135.62	11.58	244.01
2	F	SURFACE (P)	0	0	0	0	0	0	—	—	—	0	0	0	2F	122.27	9.88	214.94
2	G	GCP	→	→	→	20.66	2.31	42.82	4.38	.54	9.63	25.04	2.85	52.45	2G	145.86	20.66	360.93
3	A	DEEP WELL	→	→	→	→	→	→	→	→	→	110.50	2.49	127.74	3A	168.32	6.81	224.41
3	B	RAPID INFL.	→	→	→	→	→	→	→	→	→	71.25	1.10	66.48	3B	129.07	5.42	163.15
3	C	CITRUS	→	→	→	→	→	→	→	→	→	60.24	1.78	71.51	3C	131.79	7.08	190.78
3	D	CITRUS /R.I.	→	→	→	→	→	→	→	→	→	66.18	2.10	77.14	3D	123.18	6.03	169.31
3	E	SURFACE (N/P)	0	0	0	0	0	0	—	—	—	0	0	0	3E	136.13	11.50	243.76
3	F	SURFACE (P)	0	0	0	0	0	0	—	—	—	0	0	0	3F	120.96	9.91	213.94
3	G	GCP	→	→	→	22.06	2.42	45.23	3.33	.39	7.10	25.39	2.81	52.33	3G	166.56	20.54	354.97
4	A	DEEP WELL	→	→	→	→	→	→	—	—	—	110.50	2.49	127.74	4A	161.00	6.71	216.70
4	B	RAPID INFL.	→	→	→	→	→	→	—	—	—	76.88	1.09	71.28	4B	127.38	5.31	160.24
4	C	CITRUS	→	→	→	→	→	→	—	—	—	57.21	1.76	68.60	4C	120.13	6.81	177.28
4	D	CITRUS /R.I.	→	→	→	→	→	→	—	—	—	70.33	2.08	80.57	4D	119.50	5.85	163.43
4	E	SURFACE (N/P)	.14	0	.11	0	0	0	—	—	—	.14	0	.11	4E	131.94	11.34	238.66
4	F	SURFACE (P)	.14	0	.11	0	0	0	—	—	—	.14	0	.11	4F	111.78	9.89	205.26
4	G	GCP	→	→	→	26.45	2.66	51.74	—	—	—	26.45	2.66	51.74	4G	159.26	23.64	329.62

NOTES: (1) PRESENT WORTH INCLUDES DISCOUNT FOR SALVAGE VALUE

(2) LEVEL	DESCRIPTION
A	SECONDARY ONLY (DEEP WELL DISPOSAL)
B	SECONDARY ONLY (RIB DISPOSAL)
C	SECONDARY + FILTRATION (CITRUS DISPOSAL)
D	SECONDARY w/ DISINFECTION AT DISTRIBUTION SITE (CITRUS/RIB DISPOSAL)

LEVEL	DESCRIPTION
E	SECONDARY + NITRIFICATION/DENITRIFICATION - P(0.2) (SURFACE DISCHARGE)
F	SECONDARY + P(0.2) (SURFACE DISCHARGE DISPOSAL)
G	GCP = ADVANCED WASTEWATER TREATMENT (GROUNDWATER DISPOSAL)

* Source: Southwest Orange County 201 Facilities Plan,
Draft Alternatives Analysis; October, 1982; Table 9-1.

TABLE II-3 *

LEAST COST WASTEWATER TRANSMISSION TREATMENT AND DISPOSAL OPTIONS

	Design Flow (MGD)			
Alt. No.	McLeod Road WPCF	Sand Lake Rd. WWTF	NW Sub-reg.WWTF	Effluent Disposal Method
4B	20.5	22.6	0	Rapid Infiltration Basins
2B	10.9	22.6	9.6	Rapid Infiltration Basins
3B	13.7	22.6	6.8	Rapid Infiltration Basins
4D	20.5	22.6	0	Citrus/Rapid Infiltration Basins
1B	15.5	22.6	5.0	Rapid Infiltration Basins
3D	13.7	22.6	6.8	Citrus/Rapid Infiltration Basins
1D	15.5	22.6	5.0	Citrus/Rapid Infiltration Basins
2D	10.9	22.6	9.6	Citrus/Rapid Infiltration Basins

*Source: Southwest Orange County, Florida
201 Facilities Plan, Draft; October,1983; Table 5-8.

TABLE II-4*

SEPTIC TANK AND SMALL COMMUNITY SYSTEMS ALTERNATIVE

ITEM	COSTS (Million $) CAPITAL	O&M	P.W.
Transmission	22.84	0.57	25.94
Treatment/Sludge			
McLeod Road (19.2 mgd)	14.43	1.26	26.39
Sand Lake Road (21.6 mgd)	10.12	1.66	26.40
Disposal	70.33	2.08	80.57
Septic Tank System	7.30	(0.15) (1)	5.78
	125.02	5.42	165.08

Note : (1) Septic tank capital cost is the difference in cost for a septic tank system versus a collection system. The O&M cost reflects a $12/year/unit savings for septic tank system versus collection systems. Collection system O&M costs were taken from the Asbury Park I/I Report and are $0.3188/1000 gallons. Based on 70 gpcd and 2.7 people/unit, the collection system O&M cost is $22/unit/year. Septic tank O&M costs are $10/unit/year resulting in a net O&M savings at $12/unit/year.

*Source: Southwest Orange County 201 Facilities Plan,
Draft Alternatives Analysis; October, 1982; Table 10-3.

TABLE II-5*

FEDERAL NO-ACTION ALTERNATIVE

ITEM	COSTS (Million $) CAPITAL	O&M	P.W.
Transmission	29.31	0.69	33.16
Treatment/Sludge			
McLeod Road (13 mgd)	3.98	0.74	11.29
Sand Lake Road (15 mgd)	5.61	1.17	17.30
N.W. Subregional (6 mgd)	10.44	0.63	16.20
S.W. Subregional (7 mgd)	10.89	0.59	16.18
Disposal	64.01	2.04	75.19
Septic Tank System	7.30	(0.15) (1)	5.78
	124.24	5.71	175.10

Note : (1) Septic tank capital cost is the difference in cost for a septic tank system versus a collection system. The O&M cost reflects a $12/year/unit savings for septic tank system versus collection systems. Collection system O&M costs were taken from the Asbury Park I/I Report and are $0.3188/1000 gallons. Based on 70 gpcd and 2.7 people/unit, the collection system O&M cost is $22/unit/year. Septic tank O&M costs are $10/unit/year resulting in a net O&M savings at $12/unit/year.

*Source: Southwest Orange County 201 Facilities Plan, Draft Alternatives Analysis; October, 1982; Table 10-4.

TABLE II-6

OPERABILITY/IMPLEMENTABILITY ANALYSIS*

FACTOR	TREATMENT CONFIGURATION		DISPOSAL	
	TWO PLANT	THREE PLANT	RAPID INFILTRATION	CITRUS IRRIGATION/ RAPID INFILTRATION
Implementation Capability	+1	-1	-1	+1
Operability	+1	0	+1	0
Reliability	0	+1	0	0
Flexibility	0	+1	0	+1
TOTAL	+2	+1	0	+2

*		
*	Positive Factor	+1
	Non-Significant	0
	Negative Factor	-1

Source: Southwest Orange County 201 Facilities Plan, Draft Alternatives; October, 1982; Tables 9-3,9-4.

changes in wastewater characteristics and flows, ability to accommodate less than expected performance, and the ability to expand using different disposal systems.

Based on the operability/implementability evaluation, the two-plant combined citrus irrigation/rapid irrigation alternative was selected as the preferred alternative. This alternative was determined to have the advantages of the individual disposal methods, plus a high degree of flexibility.

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CHAPTER THREE

AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES AND MITIGATIVE MEASURES

A. INTRODUCTION

This chapter contains a discussion of the environmental impacts associated with the 201 wastewater management alternatives in order to identify critical differences that might lead to the selection of one alternative over another. The environmental impacts are evaluated with respect to each category of the natural and man-made environment to determine whether any alternatives may have impacts that are environmentally unacceptable or "over-riding".

B. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

B.1 Surface Water Resources

B.1.a Background

There are two major river basins draining the Southwest Orange County 201 Planning Area. These are the Kissimmee and St. Johns River Basins. The basin divide generally occurs at or south of the State Road 50 corridor which traverses the county in the east-west direction.

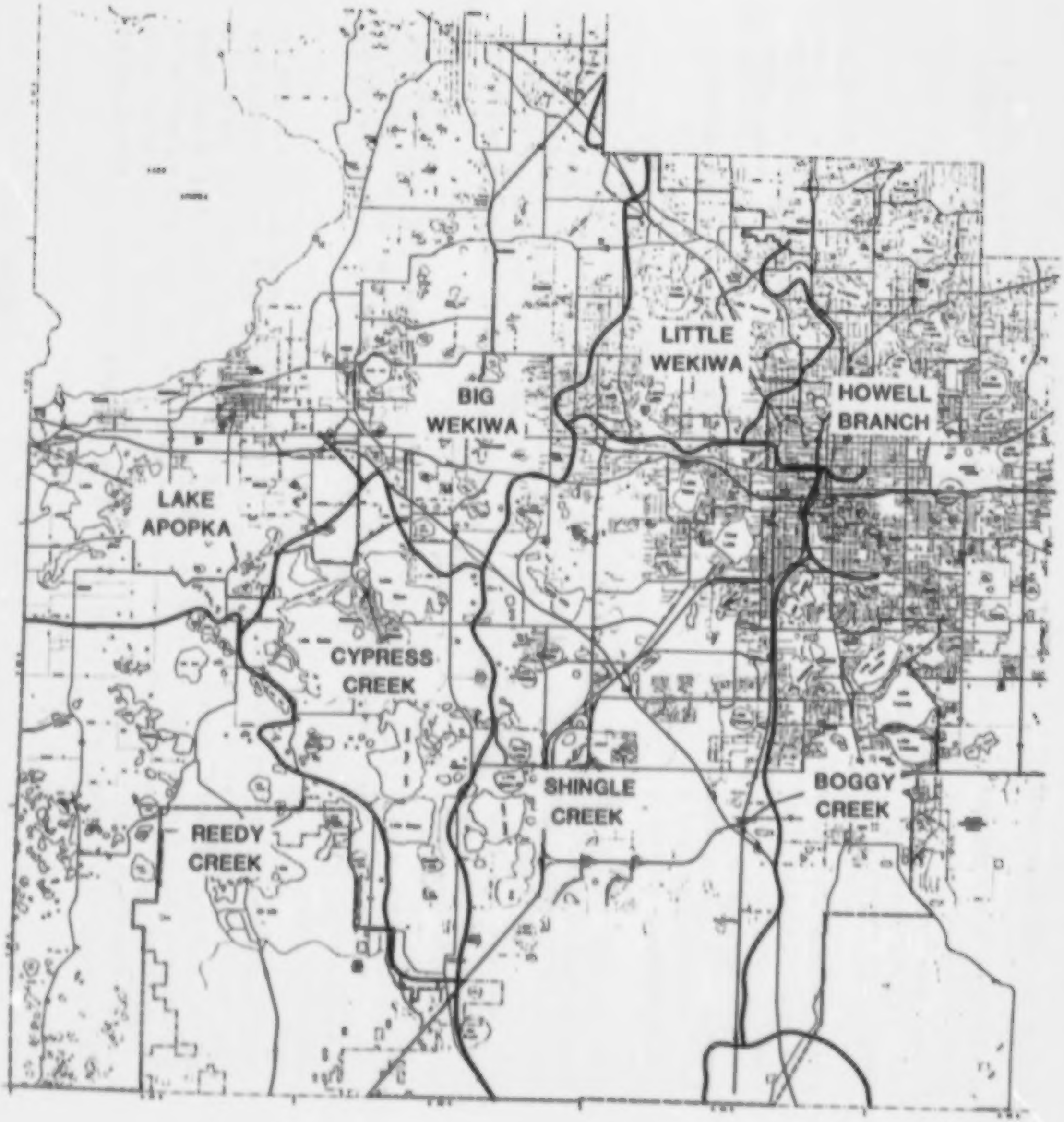
Within the 201 Area, the St. Johns River Basin includes the Big Wekiva, Little Wekiva, Lake Apopka and a small portion of the Howell Branch drainage basins. The St. Johns River drains north toward Jacksonville where the river discharges to the Atlantic Ocean. Within the Planning Area, most surface drainage in the St. John's Basin is generally to the groundwater aquifer and/or land locked lakes.

The south half of the 201 Area is within the Kissimmee River Basin and includes the Reedy Creek, Cypress Creek, Bonnet Creek, Shingle Creek, and Boggy Creek drainage basins. Surface water within the Kissimmee Basin drains to the south and eventually discharges to the Atlantic Ocean via a system of drainage canals in South Florida. Map III-1 shows the surface water drainage basins in Orange County.

There are 34 land locked lakes in the 201 Planning Area. These lakes have neither surface inflow nor outflow and rely on rainfall or groundwater inflow to replenish the water lost by evaporation.

Surface water quality within the 201 Area has been significantly degraded by stormwater runoff from urban areas and by discharges of wastewater effluent. The additional loadings of organic materials and nutrients to surface waters within the 201 Area has resulted in low dissolved oxygen levels in streams and accelerated eutrophication of lakes. These problems are particularly severe in the Shingle Creek basin. Extensive

DRAINAGE BASINS


LITTLE WEKIWA
HOWELL BRANCH
BIG WEKIWA
LAKE APOPKA
CYPRESS CREEK
SHINGLE CREEK
BOGGY CREEK
REEDY CREEK
APOPKA

LEGEND

— BASIN BOUNDARY

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

MAP III-1

channelization has reduced the natural assimilative capacity of Shingle Creek, further aggravating the water quality problems caused by urban runoff and wastewater discharges.

Orlando's McLeod Road Water Pollution Control Facility and Orange County's Sand Lake Road Wastewater Treatment Facility are the only two remaining domestic wastewater treatment plants which discharge to surface waters within the 201 Area. Their discharges have contributed to the severely degraded water quality of Shingle Creek, causing violations of dissolved oxygen criteria and excessive nutrient levels.

Lake Tohopekaliga is the eventual receiving body for the waters of Shingle Creek. Based on the results of water quality studies in the Lake Tohopekaliga basin, the Florida Game and Freshwater Fish Commission has concluded that nutrient loadings from sewage treatment plants are directly responsible for the deterioration of the lake water quality. In addition, the U.S. EPA Advanced Treatment Task Force completed an evaluation in January, 1983 of the condition of Lake Tohopekaliga. The Task Force found that the lake is exhibiting signs of increased eutrophication. Based on the evaluation, EPA recommended the substantial reduction of nutrients, particularly phosphorus, from point source discharges and the control of existing and future nonpoint sources within the lake's drainage basin in order to improve the water quality.

Existing water quality conditions in other surface waters essentially eliminate the possibility of an alternative discharge site within the 201 Area. There are no streams or lakes with adequate size or assimilative capacity to receive the discharge of such large volumes of wastewater effluent without seriously degrading water quality.

B.1.b Anticipated Impacts of Alternatives and Mitigative Measures

An evaluation was performed in order to determine the effects of the alternatives on the adjacent surface waters. The effects on both the quantity and quality of the flows to surface waters were of concern. This evaluation was based on the results of a preliminary screening analysis conducted by the 201 consultants, and should not be considered sufficiently accurate for the evaluation of specific alternatives. The analysis was useful, however, in order to compare the potential inpacts of the alternatives. These impacts are described in the following paragraphs.

Significant beneficial impacts (e.g. decreased entrophication rate of Lake Tohopekaliga, increased aquifer recharge, etc.) would be expected to result from wastewater disposal depending on the specific alternative chosen. If any one of the proposed land disposal methods was selected (e.g., citrus irrigation, rapid

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infiltration, or groundwater conservation), the wastewater flow presently discharged to Shingle Creek would be reduced or terminated.

Quantity

One of the potential impacts of most concern was the effect of effluent disposal on lake levels. Groundwater mounding caused by land application or the groundwater conservation alternatives could increase surface water elevations in the proximity of the areas of discharge. The degree to which surface water levels/flows would be affected depends upon the land disposal technique selected. Preliminary models were developed as part of the 201 planning effort to screen the alternatives and qualitatively compare the impact of the rapid infiltration, groundwater conservation and citrus irrigation alternatives on groundwater and lake levels. No increase in lake levels is expected to result from continued discharge to Shingle Creek.

Preliminary modeling efforts conducted for the 201 alternatives development and evaluation process were accomplished primarily to allow a comparative analysis of the alternatives. Simplifying assumptions (e.g. regarding leakage through subsurface confining layers and outflow from affected lakes to other surface water bodies) were used in this preliminary modeling effort due to the large areas of land involved and the lack of adequate site specific information. Therefore, specific numerical outputs of the preliminary modeling effort are presented below only for comparative, and not quantitative, evaluation. Results of detailed modeling and evaluation of the selected alternative using information obtained from detailed field studies at the proposed sites are described in Chapter IV of this EIS.

Preliminary modeling of the alternative of using only rapid infiltration basins indicated significant lake level increases in landlocked lakes near RIB sites. Increases of the magnitude estimated would be expected to have a substantial impact on adjacent land uses. For 15 of the 33 lakes modeled, however, the projected increases were less than one foot. More detailed evaluation during operation and, possibly, adjustment of application rates would be required to assure acceptable levels of impact.

For the groundwater conservation disposal option, the analysis indicated a potential impact on 42 lakes. Of this total, 33 were projected to experience an increase of less than one foot. The maximum increase modeled was 2.2 feet. While it is anticipated that increases of such small magnitude would have no detrimental impact, each lake should be examined in detail to insure that proposed increases are acceptable.

For the citrus irrigation option, the model indicated a significant increase in lake levels within the citrus irrigation target areas, based on projected application rates of 26 to 72 inches per year. It is anticipated that judicious selection of irrigation sites, combined with appropriate application rates, would maintain lakes at acceptable levels. No significant impacts would be expected for lakes outside the irrigation target area. The same types of impacts and mitigative measures would be expected for the combined citrus irrigation/rapid infiltration, on-lot, and no federal action alternatives.

Quality

The principal concern with respect to surface water quality was the potential for the wastewater disposal methods to result in increased nutrient loadings to area lakes via groundwater flow. These nutrient loadings could accelerate the eutrophication of these lakes. A preliminary analysis of selected area lakes indicated a potential for rapid infiltration to produce detrimental impacts on surface waters by increasing the nutrient loadings. Groundwater monitoring, as required by FDER, would be performed quarterly throughout the operation of the proposed rapid infiltration basins. Surface water monitoring of potentially affected lakes would also be accomplished periodically to detect any adverse impacts to lake water quality. This would ensure that if nutrient removal rates were not adequate, corrective action could be taken before significant adverse impacts occurred to adjacent surface waters.

The reclaimed wastewaters entering the water table and upper Floridan aquifers for the groundwater conservation and citrus irrigation options would be of very high quality and should have no significant detrimental impact on lake quality. This is because of the high level of treatment required for the groundwater conservation program. Also, citrus irrigation will allow nutrient uptake by the trees and reduce the fertilizer requirements for the irrigated groves. It is possible, however, that increases in groundwater table levels could decrease the amount of rainfall infiltrating into the groundwater system and thereby increase surface runoff rates as a result of implementation of the groundwater conservation alternative. This could result in an increase in sediment and nutrient loadings to surface waters. Care in recharge site location and design could minimize this impact.

The combined citrus irrigation/rapid infiltration alternative calls for reduced flows to both the rapid infiltration and citrus irrigation disposal sites, as compared with the individual alternatives. For the citrus irrigation portion of the combined alternative, the level of impact on surface water would be expected to be similar to that of the citrus irrigation alternative, although the reduced area requirement would probably allow use of only the more desirable irrigation sites, or diversion to the rapid infiltration basins. Selection of rapid infiltration basin sites which are remote from lakes would substantially decrease the potential negative impacts on surface water quality, and could eliminate those impacts entirely.

The alternatives involving continued discharge to Shingle Creek would require high levels of treatment to avoid adverse effects on surface water quality. Both Shingle Creek and Lake Tohopekaliga currently demonstrate significant quality degradation, attributable in part to existing wastewater discharges. Two alternative treatment approaches were developed which might allow continued discharge with acceptable water quality impacts. These approaches were developed for cost comparison and funding eligibility purposes only, as Orange County and the City of Orlando have agreed to adopt the "no discharge" approach.

The alternative treatment levels for the continued discharge alternative are total phosphorus removal to 0.2 mg/l, or total phosphorus removal to 0.2 mg/l combined with total nitrogen removal to 3.0 mg/l. Phosphorus reduction to Lake Tohopekaliga would equal approximately 46 percent of the present rate, or about 3 percent less than the zero discharge option. Removal of both phosphorus and nitrogen would reduce the total nitrogen loading by about 15 percent, as compared with about 21 percent removal for zero discharge. Evaluation and implementation of a non-point source control strategy would be required to provide additional protection of water quality in Lake Tohopekaliga.

The no federal action (funding) alternative would be very similar to the combined rapid infiltration/citrus irrigation alternative, except that the former includes the future continued use of individual septic tanks in low density residential areas to treat and dispose of about 2.3 mgd of wastewater from within the Urban Service Area. Septic tank disposal could impact the water quality of some lakes. Both nitrogen and phosphorus may cause water quality impacts from high density septic tank usage in low and medium potential soils where the leachate could travel laterally to surface waters. Based on the results of that evaluation, the use of septic tanks at high densities in areas contributing subsurface flows to lakes could cause water quality degradation, and would need to be evaluated in much more detail. However, this preliminary evaluation was not based on actual field data and it is anticipated that careful design, operation and regulation of septic tank disposal could minimize potential adverse impacts. Continued use of existing septic tanks in the 201 sewer service area at low densities would generally not be expected to result in significant impacts to major lakes and streams. The water quality of one small lake (Lake Floy) would be anticipated to be potentially impacted by existing septic tanks within its drainage area. Detailed on-site evaluation of septic tank pollutant loadings is required to more precisely define the extent of water quality impacts.

No significant impacts among the service area/interceptor alternatives would be anticipated with respect to development-induced erosion and stormwater runoff. The impacts that would result would be temporary, construction-related erosion and runoff. There would also be no significant water resource or water quality impacts resulting from the construction and operation of the wastewater treatment and effluent transmission facility alternatives.

B.2 Groundwater Resources

B.2.a Background

Groundwater is the source of potable water in Orange County and occurs under both nonartesian and artesian conditions. Artesian conditions prevail in West Orange County and occur where the water is confined and rises in wells above the point at which it is first encountered. The heights to which water rises in tightly cased wells that penetrate an artesian aquifer define its confined potentiometric head. The confined potentiometric head may be above, below, or at the same level as the water table, depending on local conditions.

B.2.a.(1) Floridan Aquifer

The Floridan aquifer is the most productive aquifer in the 201 Planning Area. In Orange County the Floridan is artesian and includes several geologic formations, including the permeable parts of the overlying Hawthorn formation that are in hydraulic contact with the rest of the aquifer. The clayey sand of the Hawthorn Formation retards the vertical movement of water between the water table aquifer and the underlying limestone of the Floridan aquifer.

The aquifer stores large quantities of water in caverns or solution channels. It also acts as a conduit, conveying water through cavities from areas of recharge to areas of discharge. In Orange County, the aquifer contains two major producing zones separated by a relatively impermeable zone, which lies 600 to 1,000 feet below the land surface. The water supply wells for the Cities of Orlando and Winter Park are developed in the lower zone. Many domestic and small public supply wells withdraw water from the upper zone. Although the relatively impermeable zone yields much less water than the producing zones above and below it, in many parts of the country it would be considered a good aquifer. It contains some water-bearing layers, but very few wells are developed in it.

Most of the recharge to the Floridan aquifer in Orange County originates as rainfall within the County. Some recharge occurs by underground flow from Southeastern Lake County and Northeastern Polk County. Recharge occurs whenever the water table is above the confined potentiometric surface. Additional recharge is provided by approximately 400 drainage wells in Orange County.

Potentiometric levels of the Floridan aquifer in Orange County fluctuate significantly in response to extremes of precipitation. Increased rainfall can be offset by increased pumpage. There has been a definite long-term trend of decline in potentiometric levels due, possibly, to increased pumpage and reduced precipitation.

Major discharges from the Floridan aquifer in Orange County include: spring outflows; upward leakage into the St. John's Marsh and Rock Springs Marsh; outflow into northern Lake County, Seminole County, and Brevard County; and pumpage within the County. Spring outflows are located primarily in Northwest Orange County and Southwest Seminole County.

The water quality of the Floridan aquifer has been monitored closely because of the extensive use of the aquifer as a source for public water supplies. The water quality within the aquifer appears to be relatively constant with location and depth beneath the 201 Area. The water contains moderate levels of hardness, dissolved solids, and chlorides beneath the 201 Area, but the levels increase in eastern Orange County as a result of residual salt water in the aquifer. Dissolved solids and chloride concentrations in the Floridan aquifer increase to approximately 2,000 mg/l and 1,500 mg/l, respectively, near the St. Johns River in eastern Orange County.

B.2.a.(2) Secondary Artesian Aquifers

In Orange County, several secondary artesian aquifers occur locally within the confining beds of the Hawthorn Formation and less extensively within the formations above the Hawthorn. These aquifers are usually found at depths ranging from about 60 to more than 150 feet below the land surface and are composed of discontinuous shell beds, thin limestone lenses or permeable sand-and-gravel zones.

The potentiometric level of the secondary artesian aquifer fluctuates slightly less than 5 feet, similar to the magnitude of the fluctuation in the nonartesian aquifer. Response of the potentiometric surface to rainfall is less rapid than the response of the water table but in general, both rise and decline similarly during wet and dry seasons. Recharge to the secondary artesian aquifers in Orange County is by downward leakage from the nonartesian aquifer in most parts of the County or by upward leakage from the Floridan aquifer.

The quality of water in the secondary artesian aquifer varies depending on the location, composition, and depth of the formation. In most areas of Orange County, the potentiometric surface of the secondary artesian aquifer is below the water table, allowing water to leak downward from the water table aquifer. As a result, the water quality in the secondary artesian aquifer is similar to that of the water table aquifer. In certain areas where the potentiometric level of the Floridan aquifer is greater than that of the secondary artesian aquifer, upward leakage will occur from the Floridan aquifer. In these areas, the water quality of the secondary artesian aquifer will be similar to that of the Floridan aquifer.

Generally the water in the secondary artesian aquifer is less mineralized than that of the Floridan aquifer, but more mineralized than that of the water table aquifer. The dissolved solids concentration in the secondary artesian aquifers usually range from 100 to 400 mg/l.

B.2.a.(3) Nonartesian Aquifer

The nonartesian or water table aquifer extends over the majority of the County and is composed mainly of quartz sand with varying amounts of clay, hardpan and shell. In most parts of Orange County, the base of the aquifer is approximately 40 feet below the land surface. However, in parts of the highlands region (western Orange County), the nonartesian aquifer may extend to greater depths. Its permeability and thickness and, consequently, its productivity vary. In some local areas its yield is low.

The water table in Orange County ranges from approximately zero to 20 feet below the land surface except below some of the sandhills in the western part of the county where it may be considerably deeper. In the lowlands and flatwoods sections, the water table is usually within a few feet of the land surface. The water table conforms in a general way to the configuration of the land surface, but it is usually at greater depths under hills and may be above the land surface in low swampy areas.

The water table fluctuates in response to changes in recharge and discharge in a manner similar to the fluctuation in the levels of lakes and reservoirs. Fluctuations of the water table range from a few feet in flat areas to 15 feet or more in hilly areas of the County.

Natural recharge to the nonartesian aquifer in Orange County primarily comes from rain within or near the County. Most of Orange County is blanketed with permeable sand which allows rain to infiltrate rapidly. In much of the western part of the County, the water table is far below the surface except in depressions. The surface sand can absorb rainfall at high rates with little or no direct surface runoff.

Water quality data for the nonartesian aquifer in the 201 Planning Area are very limited. The available data indicate that in western Orange County, where rainfall percolates directly into the soil, the nonartesian aquifers contain water that is soft and low in minerals. In these areas, the aquifer could be susceptible to pollution from septic tank leachate and the application of fertilizers and pesticides.

B.2.b Anticipated Impacts of Alternatives and Mitigative Measures

As with the surface water impacts evaluation, the major concerns relating to groundwaters in the Planning Area involve both quantity and quality. The evaluation of groundwater impacts was based on a preliminary analysis conducted for the 201 Plan and should not be considered sufficiently accurate for the final evaluation of a specific alternative. The information generated in the preliminary alternative analysis was adequate and, therefore, used only for a comparison of the alternatives. These impacts are discussed below. Results of detailed modeling and evaluation of the selected alternative using information obtained from detailed field studies at the proposed sites are described in Chapter IV of this EIS.

Quantity

A significant degree of groundwater mounding would be expected to be associated with each of the proposed disposal alternatives with the exception of discharge to Shingle Creek. The groundwater conservation alternative would have the greatest effect on present groundwater conditions. This alternative would involve the injection of highly treated wastewater into the upper zone of the Floridan aquifer, creating a "bubble" of water lying above the less permeable layer separating the upper and lower zones of the Floridan aquifer. This bubble would spread out within the zone, recharging the aquifer, and forcing waters within the zone to move laterally away from the injection site and, to some extent, downward into the lower zone of the Floridan aquifer. The hydrostatic pressure produced near the injection point would probably also result in two other effects: (1) an increase in the elevation of the upper surface of the saturated zone in the water table aquifer, resulting in a reduction in depth from the ground surface to the water table; and (2) an increase in the rate of "leakage" from the upper zone to the lower zone across the confining layer which separates the two zones.

Design criteria for the groundwater conservation alternative provide for a maximum increase of 12 feet in the surface water table elevation. Analyses performed for the proposed design indicate that an increase of 12 feet near the recharge sites would result in a water table increase of about 3.7 feet at a distance of 5,000 feet from the site, and the water table impact would cease to be noticeable at a distance of about 10,000 feet. While some impact on development compatability and property values could result in the immediate vicinity of the recharge sites, appropriate design of recharge systems and site selection should minimize any detrimental influences.

The initial groundwater mounding analysis in the 201 Facilities Plan predicted significant increases in groundwater levels. Initial 201 predictions of increases in groundwater levels for the citrus irrigation program were also significant, but of a lesser extent than rapid infiltration.

The combined citrus irrigation/rapid infiltration, on-lot and no federal action alternatives would use application rates similar to the rapid infiltration and citrus irrigation alternatives, resulting in similar magnitudes of groundwater mounding. The lesser flow rates associated with each disposal method for the combined, on-lot and no federal action alternatives would reduce land requirements for each method and lead to a reduction in the areal extent of impact. Additionally, it is likely that, because less land is required for each disposal method, only well-suited sites would be selected.

Based on the information available concerning the alternative disposal methods, there would be a potential for extensive groundwater mounding due to the land application alternatives with the attendant negative impacts on property values, lake levels and surface water quality. However, consideration of groundwater mounding effects in system design criteria could effectively mitigate any potential adverse impacts.

Beneficial impacts of increased recharge and potentiometric levels of the Floridan aquifer are expected with the rapid infiltration, citrus irrigation, groundwater conservation, combined citrus irrigation/rapid infiltration, on-lot and no federal action alternatives. This would help maintain existing potentiometric levels and protect the water supply aquifer against salt water intrusion. No significant adverse environmental impacts are anticipated with these increases.

Quality

Prior to implementation of any land application option in the Planning Area, assurance of adequate quality protection is essential. This is because groundwater is the source of the area's potable water supply. The groundwater conservation, citrus irrigation and rapid infiltration basin alternatives require specific levels of treatment in order to safeguard groundwater quality. Advanced wastewater treatment to produce an effluent which meets primary and secondary drinking water standards is required for the groundwater conservation alternative. The resulting quality of reclaimed wastewater is expected to be similar to that of the ambient groundwater, and may result in a slight improvement in quality with respect to some constituents in the upper zone of the Floridan aquifer. Treatment levels required for citrus irrigation and rapid infiltration are identical and involve secondary treatment followed by filtration and high level disinfection. Additional treatment of the applied effluent would be provided in the soil matrix. The extent of additional renovation would be expected to be greater with citrus irrigation than rapid infiltration basins due to the application rates involved. Primary and secondary drinking water standards would be met by both of the land application options. No significant impacts to groundwater quality are expected from implementation of the three alternatives discussed above.

The projected impacts of the combined citrus irrigation/rapid infiltration alternative would be the same as those given above for the individual disposal techniques. There were no significant impacts with respect to groundwater quality expected to result from the continued discharge to Shingle Creek option.

The no federal action alternative would utilize disposal through individual septic tanks in several residential areas, and use of the combined rapid infiltration/citrus irrigation option for centralized disposal. As discussed above, use of the latter technique would not result in significant groundwater degradation. Use of septic tanks as proposed, however, may have a detrimental impact on groundwater quality in some locations where drain fields are located in excessively well-drained soils. While this problem represents a significant concern within the Planning Area, careful site selection and process design, combined with regulatory constraints, could minimize associated impacts.

None of the service area/interceptor alternatives were found to have potential adverse impacts on area groundwater. Continued use of existing septic tanks within the proposed 201 sewer serviceareas will also not significantly impact the groundwaters of the Planning Area.

B.3 Land Resources

B.3.a Background

Planning Area topography is generally flat in the eastern portion with gently rolling hills in the western portion. The flat lands typically consist of swampy areas or have seasonally high water tables. Due to their lack of topographical relief, they are characterized by poor drainage. Generally, the western portion of the Planning Area is characterized by sinkhole depressions and lakes with good localized drainage.

The Orange County 201 Planning Area has been divided into the following two topographic regions:

(1) Intermediate regions where elevations are generally between 35 and 105 feet; and
(2) Highland regions where elevations are generally above 105 feet

The intermediate region is characterized as exhibiting good to very poor recharge potential. It has many lakes in some areas and none in others. Surface streams in the intermediate region usually recede to very low flow or are dry after relatively short periods of drought. Good recharge areas generally occur in the areas immediately adjacent to the highlands region. Areas of very poor recharge potential generally occur in areas of the southeast part of the Planning Area and between the Orlando and Mount Dora Ridges.

The highland region is characterized by many lakes and depressions with few surface streams. This region is generally the most effective natural groundwater recharge area. The highest land in the Planning Area occurs in the Lake Apopka drainage basin at the Orange-Lake County line. A minimum elevation in the Planning Area of about 60 feet (mean sea level) occurs at various locations in the Big Wekiva and Little Wekiva drainage basins.

Soils found in the Planning Area are typically fine sandy clays and fine sandy loams, with some peats and muck. Most of the soils are very permeable; however, seasonal water tables are near the surface in some parts of the 201 Area. Where long term water tables have persisted, hardpan layers have developed and act further to impede the downward movement of water. Various soils in the uplands regions do not, however, contain hardpan layers or clays in the upper five feet of their profiles.

B.3.b Impacts of Alternatives on Land Resources and Mitigative Measures

There will be no long term environmental impacts on the topography, geology and soils due to implementation of any of the service area/interceptor alternatives. Short term construction-related soil erosion impacts are anticipated but are not expected to be significant with normal construction practices employed in the area. There are, however, potential impacts related to construction and operation activities of the proposed treatment plant, transmission line and effluent disposal methods. These impacts include land reshaping, soil erosion and sinkhole formation. Soil erosion is the only potential impact common to all the alternatives, and is not anticipated to be of a significant nature. Land reshaping and sinkhole development is not of concern with respect to treatment and transmission alternatives.

Land Reshaping

The following alternatives would involve land reshaping: rapid infiltration, citrus irrigation, combined citrus irrigation/rapid infiltration and no federal action. The groundwater conservation and surface water discharge alternatives would not alter the topography significantly and are not considered further.

The citrus irrigation alternative would require the construction of a reserve storage reservoir to serve as a backup for the distribution system requirements. Construction of the reserve storage reservoir would impact the topography only slightly because the embankment necessary to fulfill the storage requirements would be relatively low in height. The maximum length of the embankment would be slightly under 5000 feet, corresponding to the largest reservoir size. Drainage patterns and recharge in the vicinity of the reservoir should not be altered significantly.

Land reshaping would be required for construction of rapid infiltration basins. However, rapid infiltration basins would utilize a small percentage of the sites and would have little or no impact on drainage patterns. Similarly, the combined rapid infiltration/citrus irrigation alternative, including the no federal action alternative, would have a similar impact on the land resources. The difference would consist in the land area affected by rapid infiltration basins, and the fact that a reserve storage reservoir would not be necessary for the citrus irrigation portion of the combined alternative. Therefore, the only land resource impact relating to land reshaping would be from the rapid infiltration portion of the combined alternative.

Sinkhole Formation

The potential for development of sinkholes would be increased by all of the land treatment alternatives considered except the citrus irrigation option. Rapid infiltration, including the combined alternative and no federal action alternative, would increase the downward flow of groundwater, which can transport sediment from the unconsolidated strata into voids which are present in the limestone/dolomite strata. The groundwater conservation alternative would enhance sinkhole development because reclaimed wastewater would be injected directly into the carbonate rocks. Dissolution of the lime rock would occur, causing the enlargment of existing caverns.

It should be noted that the development of sinkholes in the rural areas associated with the rapid infiltration scenarios would most likely not cause severe damage. This is primarily because most of the lands are open space or agricultural. However, the groundwater injection sites would be nearer to urban areas and could cause more severe damage. Predictive studies, such as lineament studies, borings, and surface geophysical methods, could be conducted on the alternative sites to avoid location of disposal fields in the vicinity of high sinkhole risk areas.

Secondary impacts on the local environment related to the land resources of the area would be limited to the visual aspects of effluent disposal for the proposed alternatives. From this visual perspective, the rapid infiltration alternative could affect the greatest quantity of land with a total site area of over 4,000 acres. However, as the wetted area would be only 1000 acres, landscaping could reduce the potential impacts related to the appearance of the sites after the basins are constructed. Therefore, no significant secondary impacts on land resources would be anticipated.

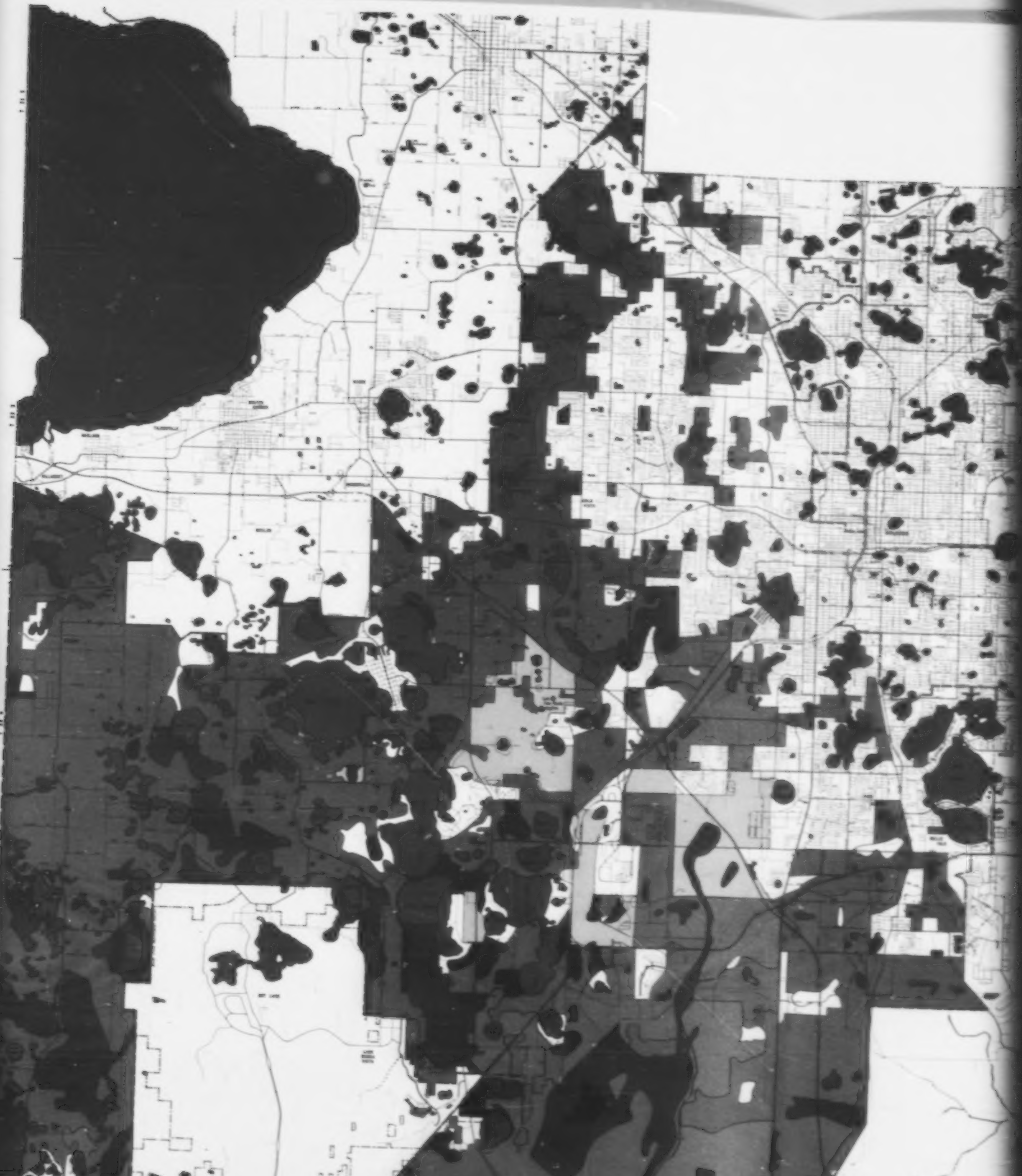
B.4 Ecological Resources

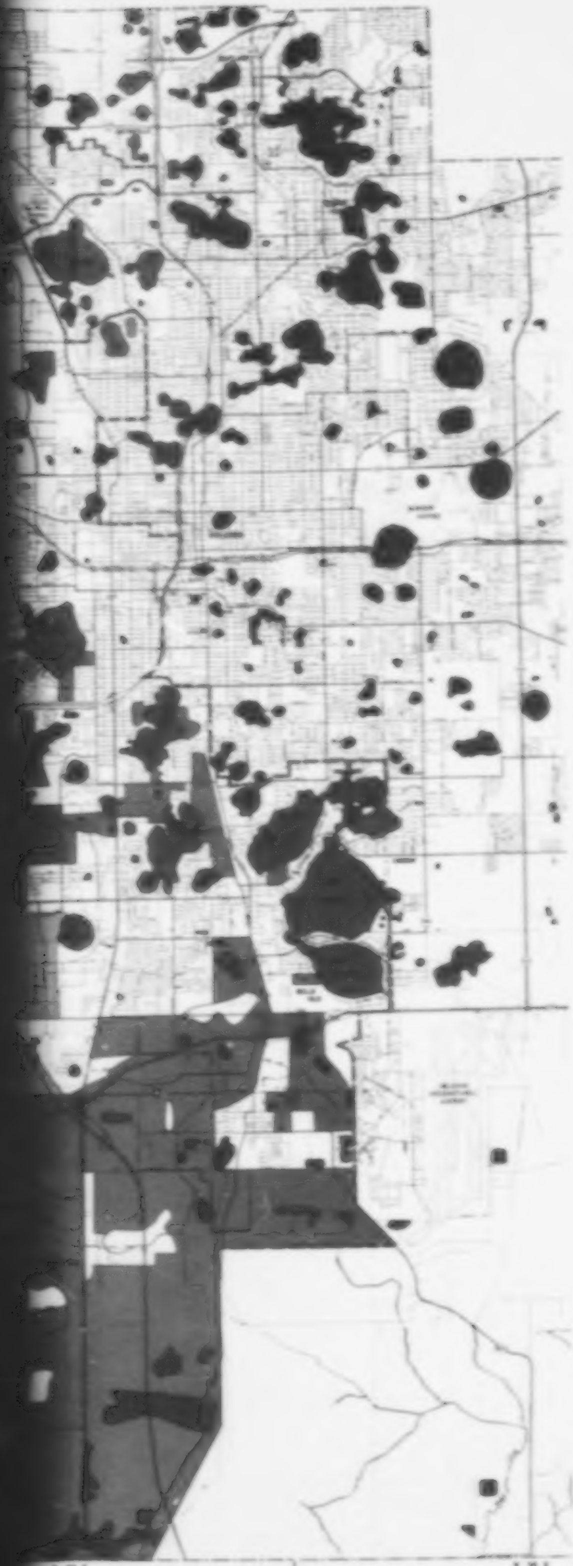
B.4.a Background

Terrestrial ecological communities in the 201 Planning Area consists of various combinations of plant and animal communities. The natural vegetation in Orange County includes mixed hardwood and pine forests located in areas with suitable soil and moisture characteristics. In other areas, where the sandy soils are deep and excessively drained, a scrubby vegetation exists consisting of scrub live oak, sand pine, a few turkey and bluejack oak, saw palmettos and grasses. The various terrestrial communities and their locations are depicted on Map III-2.

The type of animal community present is significantly determined by vegetation or human factors. Vegetation is the basis of the food chain, and is consumed directly or indirectly by all animals. The human factors determining the animal community make-up include hunting and habitat alteration. Wetlands are the most ecologically significant areas. This is because the majority of the different plant and animal species (e.g. 56% of all tree species and 34% of bird species) are located in or associated with wetland areas. Relatively few plant and animal species are associated with the upland and flatland areas. There are three wetland communities identified by the Orange County Growth Management Policy (GMP). These communities extend into the Planning Area, and are as follows: Cypress Domes and Strands; Freshwater Marshes; and Hardwood Swamp Forests.

Cypress domes are distinctive wetland communities found extensively throughout Florida. Ponding of surface waters favors the growth of cypress trees and other water-tolerant plants such as shrubs and ferns, and prevents the growth of less water-tolerant tree species. The yearly hydrocycle of cypress domes and strands has other ecological importance. Because the hardpan layer slows down the percolation of water from the pond, a steady release of ponded water to the groundwater is maintained and, during times of drought, this steady release of water becomes important in preventing adjacent soils and the vegetation which they support from drying out, thus dimenishing the likelihood of a catastrophic fire. Although they are dependent on fluctuating water levels, cypress domes are sensitive to lengthy artificial changes in their water regimes. Raising or lowering the water level of a pond beyond its natural limits for an unusually long time can bring about changes in its floral characteristics, thereby upsetting its ecological balance. Cypress Strands, unlike cypress domes, are characterized by moving water, and





TERRESTRIAL COMMUNITIES

LEGEND

- ▨ PINE FLATWOODS
- ■ LONGLEAF PINE/OAK ASSOCIATIONS
- ■ PINE SAND HILL
- ░ PINE PLANTATION
- ▨ AGRICULTURAL AND OPEN AREAS
- ■ WETLANDS
- □ URBAN AND DEVELOPED AREAS

SOURCE: CONSERVATION ELEMENT, ORANGE COUNTY
GROWTH MANAGEMENT POLICY, 1980

1 1/2 0 1
SCALE IN MILES

N

ENVIRONMENTAL IMPACT STATEMENT

SOUTHWEST ORANGE COUNTY 201 PLAN

MAP III-2

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY
PREPARED BY MAYES, SUDDERTH & ETHEREDGE, INC.

consist of a thin sheet of freshwater flowing through a shallow forested depression. They are usually found in association with marshes and cypress forests. Cypress trees grow very well in moving water and consequently, they can attain large sizes in this type of environment. Strands have an ecosystem similar to that of cypress domes, and are controlled by a hydrocycle. The influence of changing water levels has less of an effect on cypress strands than it does on cypress domes.

Freshwater marshes cover only a small amount of land in the Planning Area, and are found surrounding freshwater ponds, lakes, and depressions in addition to the floodplains of streams and rivers. Marshes consist of non-forested areas which are subjected to permanent or prolonged periods of inundation or saturation. Freshwater marshes are essentially ecotones, and have characteristics of both aquatic and terrestrial communities. This combination results in excellent habitat for a diversity of wildlife species. Marshes support a lush vegetation consisting of shrubs, grasses and sedges, which make this community one of the most productive ecosystems known. They are distinguished by a lack of overstory vegetation, although a few small trees and shrubs can be found in ecotones between marshes and adjacent upland communities. They are formed when organic matter accumulates along the edges of water bodies and hydrophytic grasses become established. Marshes help retain water during droughts and mitigate the effects of floodwaters by slowing down floodwaters and buffering their erosional force. Marshes act as filters for the adjacent water body by utilizing nutrients dissolved in the water.

The hardwood swamp forest community is characterized by deciduous trees and is found bordering rivers, streams, and lakes throughout Florida. Hardwood swamp forests are subject to periodic flooding, especially during the summer rainy season. Vegetation in hardwood swamp forests consists primarily of overstory trees and understory trees and shrubs, with groundcover being sparse to non-existent. The lack of ground cover is also attributable to the periodic flooding which characterizes this community. These communities protect water bodies by retaining floodwaters and take up nutrients from floodwaters, thereby reducing the nutrient load being borne by the water body. Their importance as feeding and breeding grounds for both terrestrial and aquatic animals is very significant, because of the number of individuals involved and because of the diversity of life forms involved. Not only do hardwood swamps utilize floodwaters, but they are dependent on this type of hydrocycle and, if the periodic flooding is interrupted either by continual flooding or draining the swamp, the resident community will be replaced by a community composed of lowland hardwoods which are less dependent on flooded conditions.

Florida has developed a well diversified natural aquatic flora. Aquatic plants commonly found in water bodies in the Planning

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Area include pickerel weed, water hyacinth, spatterdock, fanwort, rushes, bladderworts, cattail, arrowroot, and emergent grasses. Climatic conditions, which are so ideal for native plant growth, also contribute to an aquatic weed problem which has developed in the State's waterways over the years. In addition to the warm, moist climate, other factors contributing to this problem are the long growing season and the abundance of nutrient rich water bodies. Not only is excessive growth of native aquatic plants a problem in Florida, but exotic plants, which have been introduced accidentally or on purpose, have created some of the most severe infestations. For the most part, native plants are controlled by natural controls which have developed over thousands of years, such as other plants and animals or insects. However, plants which have been introduced from outside of the United States such as water hyacinth and hydrilla generally have no such controls or are better able to compete for food and growing space.

Data collected by the Orange County Pollution Control Department indicate that several nuisance plants are found in the Planning Area and that some are creating problems. Probably the most commonly reported nuisance aquatic plants are water hyacinth, hydrilla, water lettuce, duckweed, and aquatic grasses such as arrowhead.

Aquatic vegetation is vital to the life of any water body. The basic role of all green plants, including microscopic algae and vascular macrophytes is to remove dissolved nutrients from their aquatic environment, utilize these nutrients for growth and respiration and produce oxygen. This process of photosynthesis is one of the most important biological processes taking place in any water body because the oxygen produced is essential to aquatic animals and is necessary for chemical oxidation processes which take place in the water body. Rooted and floating aquatic plants (macrophytes) also provide food, surfaces for egg attachment, and shelter for an array of aquatic animals. Over 46 species of fish have been identified as having a range which includes the 201 Planning Area. Amphibians and reptiles are also quite abundant.

None of the terrestrial communities existing in the Planning Area, shown on Map III-2, are considered rare or unique. Lists of species which are endangered, threatened or of special concern and which could occur in the terrestrial, wetland and aquatic communities found in the 201 Area are presented in Appendix B.

B.4.b Anticipated Impacts of Alternatives on Ecological Resources and Mitigative Measures

Potential impacts to ecological resources are evaluated in the following paragraphs. The primary impacts to be evaluated relate to: (1) removal of vegetation for construction of the proposed facilities and development to be accommodated by the project; and (2) the potential impacts on ecological resources due to

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operation of the alternatives. Operational concerns are related to the impact of increased lake levels, and nutrient impacts on aquatic and wetland communities.

Project Construction

Impacts resulting from interceptor and transmission line construction were evaluated with respect to plant, animal and aquatic communities. All the alternatives, with the exception of interceptor Alternative 4, were found to cause no significant impacts on the ecological resources. Interceptor Alternative 4 involves paralleling an existing interceptor which crosses a hardwood swamp forest wetland and would require drawdown of the water table during construction. Hardwood swamp forest is considered to be an ecologically significant vegetation type. The destruction of this vegetation during construction would be a potentially significant impact; however, because previous construction through the area did not result in a permanent change in vegetation, it is assumed that the proposed construction would not permanently impact the vegetation.

Accommodated Development

Permanent impacts will result from projected urban development due to the availability of wastewater treatment service. However, none of the ecosystems in the portions of the Urban Service Area which are planned to be developed are considered rare or unique. Existing wetland areas were designated as "conservation" areas in the County's Growth Management Policy.

Lake Levels

The impact assessment of the effluent disposal alternatives found that, in general, they would have little or no significant impact on the plant and animal communities. The rapid infiltration basins are an exception in that they could significantly increase the water level of nearby lakes. Lake level increases could cause permanent changes in the aquatic ecosystem and adjoining wetlands. These changes are not necessarily detrimental to ecological resources. Over a period of several years, the aquatic ecosystem would gradually change and approach a normal lake ecosystem.If the topography around the lake is appropriate, new wetlands may eventually form to replace those that were inundated.

The combined rapid infiltration/citrus irrigation, no federal action, and on-lot disposal alternatives would increase the variation in the natural annual cycle of lake levels. The cyclic changes in water levels could prohibit the development of new rooted aquatic vegetation or wetlands. If this were to occur, members of the animal community and fish could be reduced due to the reduction in aquatic vegetation.

Discharge to Shingle Creek

The alternatives involving continued discharge to Shingle Creek were evaluated for nutrient impacts on aquatic ecosystems. These alternatives would not completely eliminate the eutrophication problem, but they would significantly improve upon existing conditions. This is due to existing nonpoint sources (e.g. agricultural runoff) and the availability of nutrients previously deposited in bottom sediments.

B.5 Population, Land Use and Economy

B.5.a Population and Land Use - Background

The current resident or year round population distribution throughout the 201 Planning Area varies considerably. Generally speaking, the eastern portion of the Planning Area includes the heaviest concentrations of population while the western regions are sparcely populated. Table A-1 in Appendix A contains existing and projected population data disaggregated into small geographic areas called traffic zones. Map II-1, in the previous Chapter, illustrates the locations of these traffic zones.

The resident population of the 201 Planning Area in 1980 was estimated by the Orange County Planning Department to be 181,425, or 38.7 percent of the County total. Over the course of the 20 year planning period (1980-2000), total County resident population is projected to increase by about 49.5 percent to approximately 700,900. The corresponding projected Year 2000 total resident population for the 201 Planning Area is estimated at 295,573, indicating an increase of 62.9 percent in the 201 district. Therefore, population growth is anticipated to occur in the 201 Planning Area at a faster rate than that anticipated for the County as a whole. The 201 Planning Area is projected to accommodate approximately 42.2 percent of the total Countywide population in the Year 2000.

Transient population includes all those persons who either reside or visit the area for a short period of time, generally two to three weeks. Total 1980 transient population in the 201 Planning Area was estimated at 25,826. By the Year 2000, transient population is forecasted to increase by 165.9 percent to a total of 68,681. Unlike resident population, transient population is not widely dispersed throughout the 201 Planning Area. It is generally associated with areas heavily impacted by the local tourist industry, particularly in the Florida Center/International Drive areas. Table A-1 in Appendix A also provides disaggregations of existing and projected transient population by traffic zone.

The 201 Planning Area comprises 149,639 acres. It has been separated into an Urban Service Area and a Rural Service Area as a result of the Orange County Growth Management Policy (GMP).

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The Urban Service Area is intended to have a full range of urban services, including central water and sewer, fire protection, transportation access, primary drainage, schools, libraries, recreation, and health facilities, which either presently exist or are planned to be available by the Year 2000. The Rural Service Area is that area of the County which is not included in the Urban Service Area. It generally contains agricultural and rural residential development which do not require urban levels of service. This area is characterized by the use of septic tanks, individual wells, unpaved streets with stabilized bases, and rural levels of police and fire protection.

The western half (west of Lake Down and Lake Tibet Butler) of the 201 Planning Area is rural with lakes scattered throughout the landscape. Land uses vary between agricultural production of citrus crops and vacant lands consisting of forests, wetlands and other undeveloped lands. With the exception of the Reedy Creek Improvement District, there are no public centralized water or sewer systems in the western half of the Planning Area. Scattered homes generally appear on lots of a minimum of one acre in size. The only urban development is the City of Windermere where homes are found generally on lots no smaller than one-half acre. Commercial and industrial uses are extremely limited in this western portion of the 201 Area.

Within the eastern half of the Planning Area, urban development intensifies from the Butler Chain of Lakes into the City of Orlando. Single family residential development is clustered in subdivisions. Multifamily development extends to the limits of sewer service areas.

Various commercial and industrial areas exist throughout the 201 Area. Tourist-related businesses predominate in the vicinity of the International Drive corridor. Other retail and general commercial centers dominate arterial highways. Industrial areas include the Lockhart area, the Community of Taft and the Orlando Central Park industrial center. Other land uses, such as institutional and recreational, are generally scattered throughout the Planning Area.

New development in the Rural Service Area will be permitted at gross densities less than or equal to one dwelling unit per 2.0 gross acres, except as may be otherwise provided in the GMP. The Urban Service Area is expected to increase from 113,976 acres (1978) to 157,310 acres in the Year 2000. Projected acreages for each type of land use in the urban area are provided below:

Land Use	1978 (Acres)	Year 2000 (Acres)
Residential	47,875	71,366
Commercial	7,069	13,215
Industrial	2,258	6,187
Other Land Uses	23,575	17,115
Vacant Residual	33,199	49,427
TOTAL	113,976	157,310

Maps II-2 and II-3 in Chapter II display the locations of the existing and future land use categories in the Planning Area.

B.5.b Impacts of Alternatives on Population and Land Use Projections and Mitigative Measures

This section contains a summary of the evaluations conducted to determine the potential impacts of the alternatives on existing and planned land use. Primary impacts, i.e. those related directly to the construction and operation of the alternatives, as well as secondary impacts were considered. Secondary impacts are those impacts which can be expected to occur as a result of implementation, but are not direct effects. A primary example of an adverse secondary impact is unplanned development of an area as a result of access to an interceptor system.

Service Area/Interceptors

Interceptor routes and the provision of central sewer service were the most important considerations in evaluating the primary and secondary impacts of the service area/interceptor alternatives. The 201 Plan considers the provision of centralized sewer service only in the Urban Service Area. This is in support of the County's Growth Management Policy (GMP). The removal of agriculturally unique areas (citrus groves) for development activities within the Urban Service Area will occur under the County's approach to growth management within the urban area. There were approximately 8,500 acres of unique agricultural soils located in the Urban Service area portion of the 201 Planning Area in 1978. Approximately 4,900 acres of active citrus were located in these soil areas, with the remaining acreage (i.e. 3,600 acres) primarily vacant land with scattered residential uses. The Orange County GMP projected that approximately 31 percent of the existing vacant and agricultural soils areas would remain at the end of the twenty-year planning period. According to Orange County tax assessment records, there were 54,000 acres of citrus in Orange County in 1983, which is

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about 3,000 acres more than reported in the Orange County GMP for 1976. Therefore, regardless of the alternative selected, including the no federal action alternative, the impact of this planned land conversion is that certain agriculturally productive areas will be removed from the economic base of the County while other lands are converted to agricultural usage. By encouraging urban development to stay within a defined boundary, the provision and cost of providing urban services to an expanding population becomes somewhat more manageable for County government and agricultural land uses are promoted in the Rural Service Area where development pressure is reduced.

All of the alternatives being considered potentially could have the secondary impact of shifting or inducing growth within the established service area, with the exception of the Sand Lake Road Service Area/Interceptor Alternative. This relates specifically to the interceptor corridors at the northern end of Pine Hills Road, north to Beggs Road. This corridor is common to all interceptor alternatives in this portion of the sewer service area. Interceptor improvements in the Sand Lake Road service area involve interceptor and pump station upgrading only and, therefore, would encourage in-filling of existing developed areas rather than encouraging new development areas.

It should be noted that any shifting of population and induced growth levels into areas are not anticipated to exceed recommendations outlined in the GMP. At best, areas presently without central sewer service would be opened for new development at potentially greater densities and intensities. It can be expected that routes adjacent to vacant land with lower raw land values along the urban fringe will become more attractive to development. But development of these areas is more a function of market timing, location and the availability of all required urban services, than the potential access to a sewer interceptor alone. The planned phasing of interceptor improvements will effectively mitigate these impacts.

Each of the alternatives utilizing the northwest subregional plant site, which would be located outside the Urban Service Area has a potential for significant secondary impacts by inducing growth outside the established service area. If development pressures were introduced due to the presence of a force main to the treatment facility, housing densities and population could increase, thus increasing the daily sewage load.

However, several factors would preclude these population impacts from occurring. The interceptors will be designed under the 201 Facilities Plan to accommodate the projected Year 2000 growth in the existing Urban Service Area. Also, interceptor lines and the proposed treatment will be constructed in staged increments. Therefore, any available capacity within the interceptor system will be shortlived until treated flows reach design flows. Moreover, each of the alternatives assumes only the Year 2000 urban area flows will be handled through the system configurations, not additional flows from rural areas converted to urban designation. Finally, it is questionable if the County would allow other urban services to be provided in this rural area, e.g. water.

Construction of interceptor routes under any of the alternatives will have minor short-term impacts on adjacent land uses and economic activities such as disruption of traffic, and construction noise and dust. Commercial and industrial activities are also not expected to be significantly impacted by construction.

There are also benefits which would result from the selection of any of the service area/interceptor alternatives. For the most part, the proposed interceptor routes and service area configurations support the concepts and policies outlined in the County and City GMP's, in that expanded central sewer would be made available within the defined area prescribed for future urban development. More intense urban development would be allowed to take place through "infilling", assuming related key urban services were also available. Intensive commercial/industrial development, which is a significant tax revenue producer, would benefit from the expanded sewer service. Finally, the accessibility to an expanded interceptor system would have a beneficial effect by providing the development market place with more viable options at mixed densities and intensities, since the inventory of vacant developable land with access to sewer service would increase.

Treatment, Transmission and Disposal

Alternatives related to wastewater treatment and effluent transmission and disposal were evaluated with the exception of the alternatives involving discharges to Shingle Creek. No discernable impacts on population and land uses were expected because these alternatives involved an improved treatment method over the present disposal method.

With respect to the transmission corridors for each of the disposal options, no adverse impacts beyond the construction stage would be anticipated. The construction of the transmission alternatives, as well as the treatment and disposal alternatives, would not cause long term impacts on residents or land use activities. Temporary inconveniences due to dust, noise and altered travel patterns will occur, but will not be of a significant nature. Unlike the proposed interceptor routes, which collect raw wastewater, transmission lines penetrating into the rural service areas of Orange County cannot be accessed for sewer service by nearby development. The transmission lines transport only treated wastewaters.

There would not be relocation impacts for any of the treatment plant alternatives or for the effluent disposal alternatives involving citrus irrigation, groundwater conservation and no federal action. Furthermore, no residents or businesses would be significantly impacted or relocated by transmission line construction under any of the alternatives proposed. For the rapid infiltration basin alternatives, no significant relocation impacts should be encountered due to the types of land use activities present on the proposed sites. The size of the individual sites would allow flexibility in determining the specific basin locations. Most of the sites would not experience direct urban development pressure during the 201 Facilities Planning period, with the exception of Sites 5A, 5C and 5D. These sites are shown on Map II-11. Because of their location within the urbanizing corridor between Silver Star Road and Old Winter Garden Road, and the fact that urban development continues to push west toward Winter Garden/Ocoee through this corridor, Sites 5A, 5C and 5D could be completely surrounded by urban development by the Year 2000. This could lead to long term problems for development on the peripheral areas of the designated site due to increased water tables and lake levels resulting from RIB operations.

Construction and operation of RIBs adjacent to developed or developing areas could impact property values of these adjacent properties. Site design should consider the visual perception of the sites and individual basins. Due to the level of preapplication treatment to be provided, odor impacts are not anticipated to be a potential problem for adjacent land uses. Impacts from induced growth and population shifts would not be expected for any of the transmission, treatment and disposal alternatives.

No significant operational impacts would be anticipated for the treatment alternatives. However, expected lake level increases associated with the groundwater conservation and land disposal alternatives would have both beneficial and negative impacts. Although no significant land use changes would be anticipated, such as widespread flooding of residential structures, lake level increases could benefit property owners by increasing the lakes recreational value and, therefore, the property values along shorelines. Negative impacts due to increased lake levels could include property damage from inundation.

The possibility also exists for increased groundwater tables in and around many of the rapid infiltration sites, potentially leading to premature failure of existing septic systems and increased development costs for newer septic systems installed adjacent to the disposal areas. Of the no discharge alternatives, the citrus irrigation and combined citrus irrigation/rapid infiltration basin alternative, would have the least impact on land use.

An important consideration with respect to the citrus irrigation, rapid infiltration and combined citrus irrigation/rapid infiltration disposal alternatives involves the potential impacts on agriculturally unique areas in western Orange County. An estimated 19,000 acres of citrus groves could be irrigated within the target areas being considered at the projected Year 2000 flow rate. This would be a beneficial impact due to the increased productivity of the groves and reduced fertilizer requirements. There will be no appreciable impacts to citrus groves with the Shingle Creek discharge and groundwater conservation alternatives.

Alternatives involving rapid infiltration would utilize approximately 1,065 acres of wetted area for disposal. Existing areas of citrus groves are located within each of the rapid infiltration basin sites. The exact amount of citrus acreage that would be affected was not determined because the boundaries of the individual basins were not provided in the alternatives description. However, it is known that not all of the rapid infiltration basin sites are in agriculturally unique areas. Therefore, the net impact of removing portions of these citrus groves to accommodate the basins would be negligible. Also, none of these basins will be in areas that are now active groves.

Alternatives involving citrus irrigation, could beneficially affect as many as 19,000 acres of citrus grove. Utilization of these areas for citrus irrigation disposal would have an overall beneficial effect for growers and for Orange County. Through the use of this disposal method, citrus productivity should increase within the groves, and the potential exists for reducing costs for production of citrus fruit. Agriculturally based pursuits would be encouraged to continue and these private properties would remain on the County's tax rolls. Moreover, continued private agricultural use and reduced irrigation and freeze protection costs for these citrus areas would serve to provide the County an important open space/greenbelt area consistent with the goals of the County's GMP. Finally, the use of this disposal method would reduce the overall land acquisition costs associated with the 201 Program for disposal of effluent.

Alternatives involving a combined disposal approach with rapid infiltration and citrus irrigation would affect an unknown amount of agriculturally unique land. The combined approach was developed to provide for the disposal of the excess renovated effluent not irrigated on citrus. The rapid infiltration component would utilize an estimated 464 acres of wetted area. The actual amount of citrus area to be used for basin construction cannot be determined because the actual basin boundaries were not provided. The remaining land would be used for citrus irrigation, and the impacts would be similar to those described previously for the citrus irrigation alternative.

In summary, some trade-offs exist within the disposal components with respect to unique agricultural lands. Alternatives involving citrus irrigation would serve to enhance these areas and should provide an overall net beneficial effect for growers and the County. Utilization of disposal components involving rapid infiltration basins would, to some degree, involve the removal from use of some of the County's unique agricultural land.

B.5.c Economy - Background

It is anticipated that attendant employment in the 201 Planning Area will increase both as a percent of the County-wide total and in absolute number of available jobs. Attendant employment provides a count of employment by place of work and represents, in essence, the actual number of jobs within a specific area.

The 201 Planning Area relies heavily on the agricultural and tourism industries. While the tourism industry has expanded, the agricultural industry has held relatively stable. Mechanization has limited job growth potential. In addition, due to an increased emphasis on defense spending at the national level, employment at the Martin-Marietta Orlando Aerospace Corporation has increased. The presence of the aerospace industry in Orange and Brevard counties laid the foundation for the area's best growth potential, i.e. the electronics industry. Electronics firms tend to cluster geographically to take advantage of the interchange of ideas and personnel. The presence of a cadre of skilled engineers and technicians in a quality environment has attracted additional companies to the Orlando area.

Increases in nondurable goods manufacturing employment in Orange County reflects the County's dominance in this sector. The largest industry within the nondurable goods sector is the manufacture of food and kindred products. Food industry employment accounted for 40 percent of all area nondurable goods manufacturing in 1980. Almost half of the area's food employees are involved in the production of canned, bottled and frozen fruits and vegetables. The area's location near highly productive agricultural areas makes it a logical food processing center. Almost one-tenth of Florida's food manufacturing employees work in the Orlando Metro Area.

The services sector in the Orlando Metro Area has a very high rate of growth. This rate is more than three times the national growth rate. Included in this category are personal, repair and business services; medical services; amusement, recreation and entertainment services; hotels; and legal, educational and social services. The most important subcategory is amusement services, including employment at Disney World, Sea World and Circus World, as well as at the many small tourist attractions. Hotels and motels are also significant contributors to the area's economy. The area's concentration of tourist attractions and services has made the Orlando area the world's number one vacation center. In 1979, Disney World alone attracted 13.8 million guests.

The concentration of Metro Area employment in tourist-related industries makes the area very vulnerable to economic cycles and energy shortages. With services increasing from 16.2 percent of total area employment in 1970 to 23.4 percent in 1980, the area would appear to be markedly susceptible to economic decline. This was not the case, however, during the last recession.

B.5.d Economic Impacts of Alternatives and Mitigative Measures

Economic impacts are closely related to the population and land use impacts mentioned previously. Land conversion, resulting from the development of citrus groves within the Urban Service Area, causes productive agricultural areas to be removed from the economic base of the County. However, this negative impact is offset by the reduced costs of urban services and their becoming more manageable for the County government because urban development is encouraged to stay within a defined boundary. In addition, intensive commercial and industrial development, which is a significant tax revenue producer, will benefit from the expanded sewer service.

The selection and implementation of any of the wastewater management alternatives being considered will have a net economic benefit to the County and the Region. Expansion of the economic base can be expected as a result of capital, operational and maintenance expenditures. These capital expenditures alone will create in excess of 300 new construction jobs and produce a significant revenue flow thoughout the construction period. As discussed previously, utilization of agricultural areas for citrus irrigation disposal would also be expected to have an overall beneficial effect for growers and Orange County.

Construction and operation of the wastewater management alternatives will have a major impact on the City and County wastewater program budgets. A portion (55 to 75 percent) of the capital costs could potentially be funded by an EPA grant. The remainder of the capital costs and all of the operation and maintenance costs would have to be financed locally.

Based on the estimated costs of the alternatives, minimum increases in sewer service charges of $7 to $8 for a typical Orange County customer and $4 to $5 per month for Orlando customers would be required. These are based on a water use of about 10,000 gallons per month. Resulting total average monthly service charges would increase to about $21 and $30 for City and County residents, respectively. These estimates are based on 1982 dollars and are likely to be higher when the system is actually constructed and placed into operation. In addition, these projects do not include any costs for proposed wastewater facility improvements in eastern Orlando and Orange County.

According to the Financial Capability Statement for the project (Exhibit VI of the Financial Capability Guidebook), nine of the eleven key financial indicators had strong indicator ratings, and two had average indicator ratings. These ratings are an assessment of a community's financial condition with the project. The overall net debt outstanding as a percent of personal income was estimated to be 0.67%. The condition rating for this indicator is considered strong if below 4%. Based on the Financial Capability Statement, the financial condition of the area will remain strong with implementation of the project.

B.6 Community Service and Facilities

B.6.a Background

There are over 40 educational facilities located in the 201 Planning Area. These facilities are as follows: public, private, higher and vocational. The Orange County Board of Public Instruction has sole responsibility for the facilities and services in public schools. Private facilities are owned and/or operated by a church, private organization or corporation.

Long range planning for new and expanded school facilities is accomplished on a five-year basis, with funding and approval at the State Board level. State supported new facilities are constructed only when excess capacity is not available County-wide, or when balanced school populations would require long-distance pupil busing.

Public library services are provided by the Orlando Public Library System, which is funded on a Tri-County basis by Orange, Seminole and Osceola County. The main library is located in downtown Orlando, with three branch libraries located within the Northwest and McLeod Road Service Areas. The remainder of the Northwest Service Area is handled through a bookmobile service.

Law enforcement is primarily the function of the Orange County Sheriff's Department and the Orlando Police Department. The Sheriff is responsible for the unincorporated portions of the 201 Area, and currently provides a uniform level of service on a County-wide basis. This uniformity of service is based upon population distribution and workloads within the districts, established by the Sheriff's Department. The Orlando Police Department operates in the municipal portions of the Planning Area, and provides services in a similar manner to the County's chief law enforcement officer.

Like law enforcement, fire protection is provided by Orange County and Orlando for their respective jurisdictions. Most of the property within the Orlando fire service areas is adequately covered, and has central water with fire hydrants. Orange County government has only been in the fire protection business for a short time, having consolidated the six independent fire districts within the 201 Service Area into a County-wide system. At this time, Apopka maintains the only independent fire district. Protection to the Planning Area is provided by the Lockhart, Apopka, Pine Hills, Holden Heights, Orlo Vista, Pine Castle and Taft fire stations. Some of these stations provide a higher level of service, and future growth can probably be handled with minimal impact, provided essential levels of urban water service are also provided.

Brookwood Hospital, located on Mercy Drive, is the only hospital within the service area. Over the last several years, three new private health care facilities have been constructed on Silver Star Road, Orlando-Vineland Road and Oak Ridge Road, which has helped to provide outpatient services to residents in the areas of new growth.

Water and wastewater services are provided within the service areas by a combination of County, City and private utilities. Solid waste collection is handled by the City of Orlando and within the County by private franchise agreements. The County maintains the Tropical Drive transfer station for solid waste, which in turn is transported to the County's model sanitary landfill on the east side of the County. Orlando owns the only incinerator in the Planning Area which is adjacent to the McLeod Road Water Pollution Control Facility.

Both Orange County and the City of Orlando have centralized their administrative functions in downtown Orlando, although the County does maintain three branch service centers for elected and appointed officials outside the 201 Facilities Planning Area. The administrative facilities are confined to North Hughey Avenue on the eastern edge of the proposed McLeod Service Area. This area contains the Orlando Municipal Justice, Federal and State Governmental offices. The County maintains the Sheriff's Operation and Detention Facility and Public Works offices at 33rd Street.

B.6.b Impacts of Alternatives on Community Services and Facilities and Mitigative Measures

Overall, construction and operation of any of the proposed interceptor routes would not impact community facilities and services. However, regardless of which alternative is selected, facilities and services would experience secondary impacts due to population growth that will be served by the sewer systems. Growth in service demands is not predicated on the availability of sewer service, but a result of a growing population base. All of the essential community facilities and services are affected by population shifts. Construction of the interceptor systems could have a significant impact on the City and County sewer service rates, depending on the alternative selected and the phasing of construction.

No impacts on community services and facilities would occur as a result of treatment plant location or transmission corridor placement under any of the alternatives. In addition, it is unlikely that any of the disposal alternatives would result in significant changes to the community facilities and service delivery patterns envisioned for the urban and rural areas, since no significant changes in population growth would occur within the disposal areas. Shifting of population could occur in small numbers, with the potential relocation of some land use activities, but this would not result in appreciable induced growth in other portions of the County or the 201 Planning Area. As stated previously, construction and operation of the wastewater/sludge treatment, transmission and disposal alternatives would have a major impact on the City and County wastewater program budgets.

B.7 Archaeological/Historical Resources

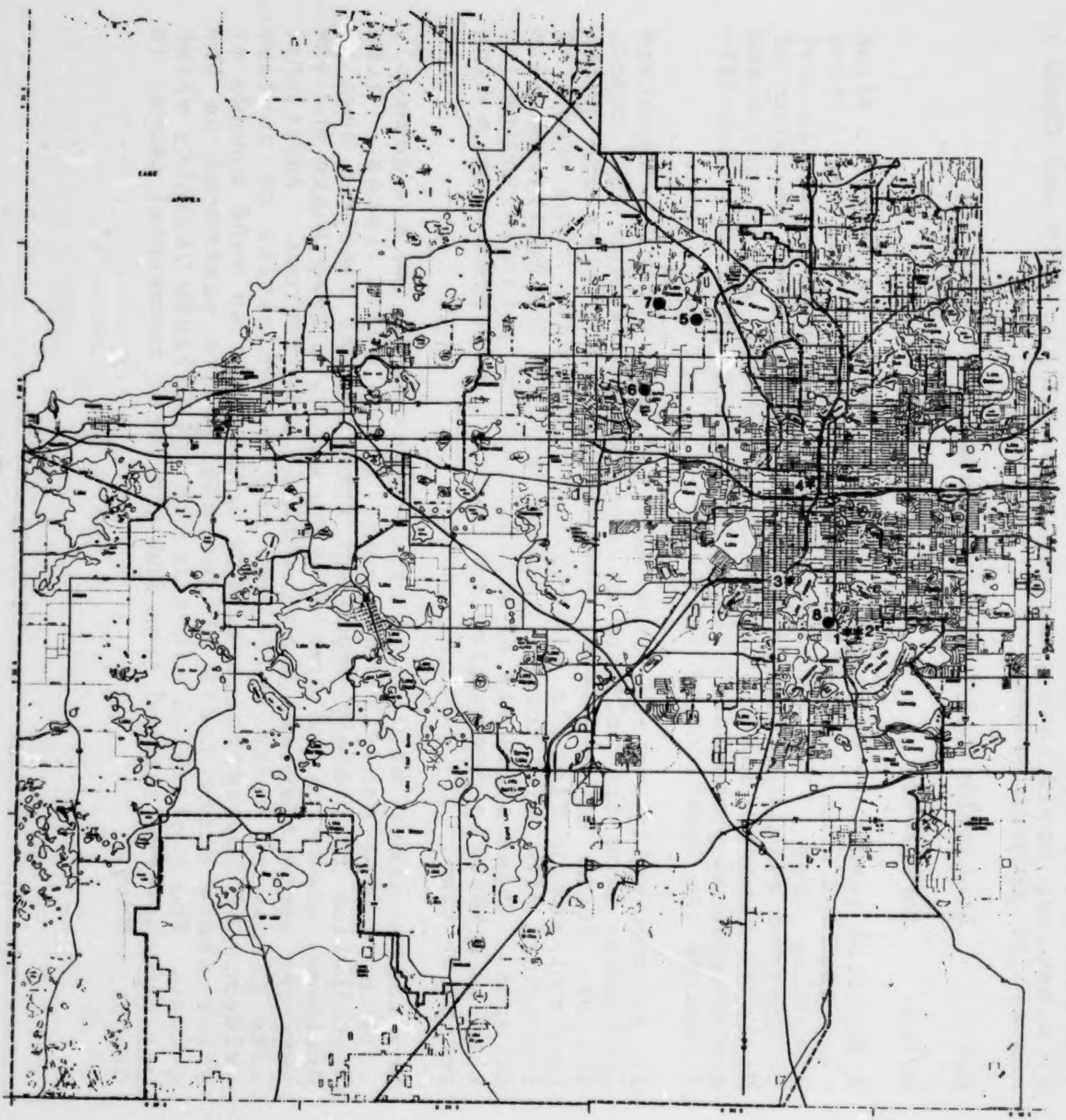
B.7.a Background

A cultural inventory consisting of prehistoric and historic sites was compiled from the background review for the 201 Facilities Planning Area. The prehistoric sites currently are not considered eligible for listing in the National Register of Historic Places. The historic sites, however, are eligible and are considered potential National Register nominations. Map III-3 depicts the locations of the sites.

It is generally agreed that the Orlando vicinity received influences from the cultures of the Central Florida Gulf coast, the St. Johns River basin, the Indian River area and north central/south Florida aboriginal cultures. The type of aboriginal site most commonly encountered is the habitation site or area. These sites are of various culture periods, indicating that prehistoric occupation of the area occurred over a long period of time.

Habitation areas, as well as other types of sites, are commonly located along sandy ridges near fresh water lakes. Site distribution is closely dependent upon natural features such as drainage, elevation and proximity to water, stream banks and the terraces above them are also potential site sources. Additional site discovery methods include the investigation of surface evidence of aboriginal activity areas such as sand mounds or areas where stone tools or pot sherds are scattered on the ground. The historical sites are in the Orlando vicinity which was the earliest settled area and the first commercial center in Orange County.

LOCATIONS OF ARCHAEOLOGICAL/ HISTORIC SITES



LEGEND

*	POTENTIAL SITES FOR NATIONAL REGISTER OF HISTORIC PLACES
1	FORT GATLIN (8-OR-92)
2	MILITARY ROAD (8-OR-91)
3	JERNIGAN (8-OR-48)
4	PROPOSED DOWNTOWN HISTORIC DISTRICT (8-OR-196)
●	OTHER SITES WITHIN 201 AREA
5	BAY LAKE (8-OR-89)
6	WEST RIDGE 1, 2, AND 3 (8-OR-51, 52 AND 53)
7	WEKINA 1 (8-OR-90)
8	LAKE JENNIE JEWEL (8-OR-88)

ENVIRONMENTAL IMPACT STATEMENT

SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

MAP III-3

B.7.b Potential Impacts of Alternatives on Archaeological/Historical Resources and Mitigative Measures

In general, little is known about the prehistoric and early historic resources in the 201 Planning Area. When predicting the presence or absence of archaeological sites for the four service area/interceptor alternatives, assumptions are made with regard to the area proposed for construction. Where construction of wastewater treatment and transmission systems will occur in upland areas near lakes or other permanent freshwater sources, a moderate to high likelihood of impacting potentially significant cultural resources is assumed. In flatwoods environments having better drained, elevated land in association with a freshwater swamp or other seasonal water source, a low to moderate potential for sites can be predicted. In those areas where freshwater sources are lacking, regardless of the topography and vegetation, a low site expectancy can be posited.

The archaeological and historical background research for the evaluation of alternatives for the Southwest Orange County EIS was designed to evaluate impacts, both primary and secondary, on known cultural resources, and to assess the potential for disturbing unknown, significant prehistoric or historic sites (i.e. sites considered to be potentially eligible for listing in the National Register of Historic Places) primarily through a literature review. This was accomplished in the following manner: 1) archaeological and historical information compiled for the EIS was systematically evaluated; 2) other, more recent cultural resource surveys in Orange County were reviewed; 3) personnel at the offices of the Florida State Historic Preservation Office in Tallahassee were contacted for additional data from the Florida Master Site File and information regarding specific impacts which might result from construction of the alternatives; 4) review of all pertinent planning documents provided details regarding the alternatives; 5) consultation with project engineers provided additional background information about the project; and 6) a "windshield" inspection of selected alternatives provided a firsthand look at some of the alternative sites.

The systematic evaluation of the alternatives described above indicated that no known archaeological or historical resources would be impacted. Detailed archaeological research evaluations for the selected plan were recommended and accomplished. These are described in Chapter IV of this Draft EIS.

B.8 Air Quality/Odor/Noise

B.8.a Background

Air quality in Orange County is required to meet the Ambient Air Quality Standards for Florida. These standards are presented in Table III-1. Photochemical oxidants are the major pollutants of

TABLE III-1
FLORIDA AMBIENT AIR QUALITY STANDARDS

POLLUTANT	ANNUAL ARITHMETIC MEAN	MAXIMUM 24-HOUR CONCENTRATION[a]	MAXIMUM 8-HOUR CONCENTRATION[a]	MAXIMUM 3-HOUR CONCENTRATION[a]	MAXIMUM 1-HOUR CONCENTRATION[a]
Sulfur Dioxide	60 ug/m^3 0.02 ppm	260 ug/m^3 0.10 ppm		1300 ug/m^3 0.50 ppm	
Particulates (TSP)	[b]60 ug/m^3	150 ug/m^3			
Carbon Monoxide			10 mg/m^3 9 ppm		40 mg/m^3 35 ppm
Ozone					235 ug/m^3 0.12 ppm
Lead	[c]1.5 ug/m^3				
Nitrogen Dioxide	100 ug/m^3 0.05 ppm				

ug = micrograms mg = milligrams ppm = parts per million

a - not to be exceeded more than once per year
b - annual geometric mean
c - maximum quarterly arithmetic mean

Source. Chapter 17-2.300, July 21, 1983, Ambient Air Quality Standards, Florida Administrative Code.

concern in Orange County. Ozone is the most common photochemical oxidant, accounting for more than 90% of the group. It is reported to be the most hazardous of the common gaseous photochemical pollutants, impacting human health as well as that of other animals and plants.

Hydrocarbons are essential to the formation of photochemical oxidants, combining with nitrogen oxides in the presence of sunlight to form these oxides. High level automobile use and associated gasoline filling stations in the Orlando-Orange County area are considered to be the cause of excessive hydrocarbon production.

Major areas of odor complaints are related to sewage treatment plants, sewage collection systems, hydrogen sulfide from well water, and manufacturing and construction industries. Sources of odor from sewage treatment facilities may include stale or septic wastewater influent, improper operation or overloading of treatment processes such as trickling filters or anaerobic sludge digestion, open drying of sludge and sludge lagooning. Odors may also result from sewage lift stations when the sewage becomes septic, as may occur during equipment failure. Other potential odor sources include industrial plants and water treatment plants which use aeration to strip hydrogen sulfide to the atmosphere.

Very little information is available on noise levels associated with wastewater systems in the 201 Area. Other sources of noise problems were reviewed in order to provide a point of reference for evaluating the impacts of wastewater facilities. These sources typically include noise from industries, refuse collection trucks and aircraft.

B.8.b Impacts of Alternatives on Air Quality/Odor/Noise and Mitigative Measures

Impacts due to interceptor construction were evaluated and found to be short-term and generally insignificant with respect to dust, emissions, odor and noise. Noise and odor impacts associated with the operation of pump stations and gravity sewers would be insignificant with proper pump selection and sewer design.

The effluent treatment, transmission and disposal alternatives were evaluated for several anticipated impacts. As with the interceptors, construction-related dust and emissions are short-term, insignificant impacts. There would be no significant odor problems associated with effluent transmission.

The potential for odors associated with the implementation of wastewater treatment facilities was a major concern. Many odor problems could be prevented by the inclusion of appropriate control facilities during design to control odors at the source. In general, flow velocities should be maintained such that deposition of solids does not occur, aeration facilities should be provided as appropriate, detention times should be carefully considered, and facilities encouraging good housekeeping should be provided. Other odor control techniques applicable to wastewater treatment facilities include the addition of chemicals such as chlorine, hydrogen peroxide, ozone, and lime; adsorption using activated carbon; chemical absorption or scrubbing; and dispersion or dilution to reduce malodors below threshold levels.

There would be no significant odor problems associated with the alternatives employing citrus irrigation. Potential odor sources due to the rapid infiltration basin effluent disposal alternative and combinations using rapid infiltration basins include applied wastewater and deposited solids during the drying cycle; however, problems should be minimal if proper operation and maintenance is observed at both the wastewater treatment facility and the rapid infiltration site. Other factors which serve to mitigate any potential impacts include the high level of treatment to be provided and the presence of buffer zones.

Noise impacts generated during construction are due primarily to the operation of major equipment, such as earth moving equipment and material handling equipment. Noise from stationary equipment is associated with the operation of the treatment facilities and includes that due to pumps, generators and blowers. The noise levels would not create a significant impact in the Planning Area. Noise control measures can be taken to minimize the noise of major equipment and system operation. In addition, the wastewater treatment plant sites, transmission pipeline corridors and effluent disposal sites are located in rural areas or generally well buffered from developed areas.

The potential for aerosol formation would be limited to areas near treatment facilities and overhead sprinklers used for the citrus irrigation alternatives. Aerosols are a concern with respect to the spread of bacteria and viruses. Based on information presented in EPA Process Design Manual for Land Treatment of Municipal Wastewater (EPA 623/1-81-013), epidemiological studies indicate that there is no significant increase in the disease rates of populations adjacent to activated sludge facilities when compared with the general population. In addition, EPA data show that aerosol fecal coliform concentrations at slow rate land application facilities are less than those at activated sludge plants. Based on this and the high level of treatment and disinfection to be provided, neither facility employees nor people living near treatment facilities should be subjected to an increased risk of disease due to aerosols. High level of treatment and chlorine disinfection prior to rapid infiltration and citrus irrigation serve to minimize the potential for any health problems due to aerosol production.

Fog formation may be a potential problem caused by citrus irrigation and rapid infiltration basins. However, this would not result in a significant impact. Spray irrigation is a procedure that is already in use at many agricultural sites in the area. Rapid infiltration basin sites would cover a much smaller area than the 41,000 acres of existing Orange County lake surface. In addition, fog formation at the rapid infiltration basins would be further minimized by the use of buffer zones.

B.9 Major Concerns

A summary of the adverse impacts, potential mitigative measures and beneficial impacts associated with the service area/interceptor alternatives and effluent disposal alternatives is provided in Tables III-2 and III-3, respectively. The majority of the impacts identified are associated with the implementation of the service area/interceptor alternatives and the effluent disposal alternatives. Impacts occurring as a result of the construction of the transmission lines and operation of the wastewater treatment facilities would not be expected to be significant. The alternative for continued discharge to Shingle Creek was not included in Table III-3, since this alternative was evaluated for funding purposes only and not considered as an implementable alternative.

All of the alternatives listed in Table III-3 result in the elimination of wastewater discharge to Shingle Creek. These alternatives were developed in response to the Florida Department of Environmental Regulation's "no discharge" requirement. This requirement was enacted to eliminate the high nutrient loadings in Shingle Creek caused by wastewater treatment plant effluent. The high nutrient loadings were contributing to the eutrophication of Lake Tohopekaliga, the eventual receiving body for the waters of Shingle Creek.

Comparing the negative and beneficial impacts of the effluent disposal alternatives in Table III-3, it can be seen that the combined citrus irrigation/rapid infiltration basin alternative would be the most environmentally advantageous option considered for effluent disposal. The combination of the two alternatives, as opposed to the individual alternatives, reduces the potentially adverse impacts, allows greater flexibility in enacting mitigative measures and increases the number of beneficial impacts. Through monitoring programs, adverse changes in lake and groundwater levels and quality can be offset by careful selection of sites and adjustment of application rates. Only the most well-suited sites would be chosen for the RIBs and the citrus irrigation areas because of the reduced land requirements. In addition, the reduced land requirements due to the utilization of privately owned citrus groves for irrigation results in a decrease in overall costs. It is anticipated that about 25 mgd would be recycled for citrus irrigation.

TABLE III-2

Summary of Major Findings

Service Area/Interceptor Alternatives

Affected Environment	Potential Adverse Impacts	Mitigative Measures	Beneficial Impacts
Population and Land Use	o Approximately 3,400 acres of area with agriculturally unique soils are estimated to be utilized for development within the Urban Service Area during the planning period.	o Unavoidable but necessary for growth management.	o Provide development marketplace with more viable options at mixed densities and intensities since vacant developable land with sewer services access would increase.
	o Shifting or inducement of growth within the established service area; routes adjacent to vacant land along the urban fringe will become more attractive to development.	o Unavoidable, but will not exceed recommendations in GMP; development potential is more a function of market timing, location and urban service availability.	o Expanded central sewer service would be available within the defined area prescribed for future urban development; provision and cost of urban services would thus be more manageable for the County government.
	o Potential for induced growth outside the established Urban Service Area for Northwest Subregional alternatives - increasing the densities and Year 2000 sewage flow.	o Strict adherence to GMP guidelines.	o Commercial and industrial development would benefit from the expanded sewer service.
Economy	o Areas with agriculturally unique soils within the Urban Service Area are removed from the economic base of the County.	o Unavoidable but necessary for growth management.	o More intense urban development allowed to take place through "infilling" of Urban Service Area (a result of staging construction).
Archaeological/Historical	o Moderate to high likelihood of cultural resources near upland lakes or other permanent freshwater sources; low to moderate likelihood in flatwood environments having better drained, elevated land in association with a freshwater swamp or other seasonal water source.	o Conduct a detailed archaeological field study and resource evaluation for the selected plan.	

Abbreviations

WW - Wastewater
GMP - Growth Management Policy
RIBs- Rapid Infiltration Basins

TABLE III - 3

Summary of Major Findings

Effluent Disposal Alternatives

Alternative	Potential Adverse Impacts	Mitigative Measures	Beneficial Impacts
Citrus Irrigation	o Increased water table and lake levels. o Increase in sediment and nutrient loading to surface waters due to an increase in groundwater table levels and subsequent increase in surface runoff rates. o Decrease in property values due to groundwater mounding. o Increase in wastewater budget for construction and operation.	o Careful selection of sites; adjust application rates. o Alter irrigation patterns to decrease applications on problem areas; divert surface runoff to areas where runoff will percolate into groundwater; provide retention basins to prevent runoff from entering surface waters. o Adjust system design criteria. o 55% - 75% of the capital costs could potentially be funded by an EPA grant.	o WW flow reduced or eliminated to Shingle Creek. o Recharge and potentiometric level increases in the Floridan aquifer. o Increase in citrus production. o Possible reduction in the cost of citrus fruit production. o Reduction in overall land acquistion cost for land application of renovated wastewater. o Maintaining agricultural use of private property would become more attractive to growers; property retained on County tax rolls. o Provides an open space/greenbelt area consistent with the County GMP. o Increase in recreational values due to lake level increases. o Enhancement of marginal wetland areas due to increase in lake levels.
Rapid Infiltration Basins	o Increase in water table and lake levels. o Increase in nutrient loadings to lakes via groundwater. o Property inundated due to groundwater mounding. o Increased potential for sinkhole development.	o Careful selection of sites; adjust application rates. o Monitor groundwater periodically during operation of RIBs; modify operation as required. o Adjust system design criteria. o Unavoidable - low probability of damage due to location in rural areas.	o WW flow reduced or eliminated to Shingle Creek. o Recharge and potentiometric level increases in the Floridan aquifer. o Increase in recreational values due to lake level increases. o Enhancement of marginal wetland areas due to increase in lake levels.

TABLE III-3

Summary of Major Findings

Effluent Disposal Alternatives
(Continued)

Alternative	Potential Adverse Impacts	Mitigative Measures	Beneficial Impacts
Rapid Infiltration Basins	o Odor problems from applied wastewater and deposited solids during the drying cycle of the RIBs.*	o Proper design, operation and maintenance; high level of treatment; buffer zones (reforestation program).**	
	o Long term operational problems for development on the RIB peripheral areas of Sites 5A, 5C and 5D (urban development pressure).	o Flexibility in choosing sites due to reduced area requirements.	
	o Premature failure of existing septic systems and increased development costs for newer septic systems due to increase in groundwater table levels near RIBs.	o Careful selection of sites; adjust application rates.	
	o Decrease in property values in areas surrounding RIBs due to aesthetics, odors and noise.*	o Proper design, operation and maintenance; high level of treatment; buffer zones (reforestation program).**	
	o Increase in wastewater budget due to construction and operation.	o 55%-75% of the capital cost could be potentially funded by an EPA grant.	
	o Permanent changes in the aquatic ecosystem and adjoining wetlands due to increase in lake levels.	o Not necessarily detrimental - over time the aquatic ecosystem will gradually change and approach normal; if the topography around the lake is appropriate, new wetlands may eventually form.	
Citrus Irrigation/Rapid Infiltration Basins	o Increase in lake levels, though not anticipated to be as significant as the rapid infiltration basin alternative.	o Careful selection of sites; adjust application rates.	o WW flow reduced or eliminated to Shingle Creek.
	o Increase in nutrient loadings to lakes via groundwater.	o Monitor groundwater periodically during operation of RIBs; modify operation as required.	o Less flow to RIBs reduces land requirements; only well-suited sites are chosen. o Recharge and potentiometric increases in the Floridan aquifer.

TABLE III-3

Summary of Major Findings

Effluent Disposal Alternatives
(Continued)

Alternative	Potential Adverse Impacts	Mitigative Measures	Beneficial Impacts
Citrus Irrigation/Rapid Infiltration Basins	o Increase in sediment and nutrient loading to surface waters due to an increase in groundwater table levels and subsequent increase in surface runoff rates.	o Reduced area requirement allows use of only the more desirable irrigation or RIB sites remote from lakes.	o Increase in citrus production. o Reduction in overall land acquisition cost for land application of renovated wastewater. o Maintaining agricultural use of private property would become more attractive to growers; property retained on County tax rolls. o Increase in recreational values due to lake level increases. o Enhancement of marginal wetland areas due to increase in lake levels. o Possible reduction in the cost of citrus fruit production. o Provides an open space/greenbelt area consistent with the County GMP.
	o Potential for sinkhole development increased, though not anticipated to be as significant as the rapid infiltration alternative.	o Unavoidable - low probability of damage due to location in rural areas.	
	o Increase in the variation of the natural annual cycle of lake levels - prohibits the development of new rooted aquatic vegetation or wetlands, causing a reduction in animal and fish communities.	o Careful selection of sites; adjust application rates.	
	o Odor problems from applied wastewater and deposited solids during the drying cycle of the RIBs.*	o Proper design, operation and maintenance; high level of treatment; buffer zones (reforestation program).**	
	o Increase in wastewater budget due to construction and operation.	o 35%-75% of the capital cost could be potentially funded by an EPA grant.	
	o Property inundated due to groundwater mounding.	o Adjust system design criteria.	
	o Premature failure of existing septic systems and increased development costs for newer septic systems due to increase in groundwater table levels near RIBs.	o Careful selection of sites; adjust application rates.	
	o Decrease in property values in areas surrounding RIBs due to aesthetics, odors and noise.*	o Proper design, operation and maintenance; high level of treatment; buffer zones (reforestation program).**	

TABLE III-2

Summary of Major Findings

Effluent Disposal Alternatives
(Continued)

Alternative	Potential Adverse Impacts	Mitigative Measures	Beneficial Impacts
Groundwater Conservation	o Greatest increase in lake levels near recharge areas (impacts development compatibility and property values in the immediate vicinity). o Increase in sediment and nutrient loading to surface waters due to an increase in groundwater table levels and subsequent increase in surface runoff rates. o Potential for sinkhole development increased - could cause severe damage in proximity of urban areas. o Greatest potential for property damage due to groundwater mounding.	o Detailed evaluation of each affected lake to ensure proposed increases are acceptable. o Careful selection of recharge site location and design. o Use of predictive studies to minimize location of disposal fields in high sinkhole risk areas. o Adjust system design criteria.	o WW flow reduced or eliminated to Shingle Creek. o Recharge and potentiometric level increases in the Floridan aquifer. o Increase in recreational values due to lake level increases. o Enhancement of wetland areas due to increase in lake levels. o Minimal land acquisition required.
No Federal Action	o Increase in lake levels, though not anticipated to be as significant as the rapid infiltration basin alternative. o Increase in sediment and nutrient loading to surface waters due to an increase in groundwater table levels and subsequent increase in surface runoff rates. o High density septic tank usage in low and medium potential soils, causing an increase in nitrogen and phosphorus loadings to groundwater and lakes. o Increased potential for sinkhole development, though not anticipated to be as significant as the rapid infiltration basin alternative.	o Careful selection of sites; adjust application rates. o Reduced area requirement allows use of only the more desirable irrigation or RIB sites remote from lakes. o Proper site selection, design, operation and regulation. o Unavoidable - low probability of damage to location in rural areas.	o WW flow reduced or eliminated to Shingle Creek. o Less flow reduces land requirements; only well-suited sites are chosen. o Increase in property values due to lake level increases. o Enhancement of marginal wetland areas due to increase in lake levels. o Recharge and potentiometric increases in the Floridan aquifer. o Increase in citrus production. o Reduction in overall land acquisition cost for land application of renovated wastewater.

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TABLE III-3

Summary of Major Findings

Effluent Disposal Alternatives
(Continued)

Alternative	Potential Adverse Impacts	Mitigative Measures	Beneficial Impacts
No Federal Action	o Increase in the variation of the natural annual cycle of lake levels - prohibits the development of new rooted aquatic vegetation or wetlands, causing a reduction in animal and fish communities.	o Careful selection of sites; adjust application rates.	o Maintaining agricultural use of private property would become more attractive to growers, thereby retaining the property on County tax rolls.
	o Aesthetic impacts of a secondary treatment facility at the Orangewood Pumping Station which is surrounded by residential development.	o Unavoidable - no practical mitigative measure.	o Provides an open space/greenbelt area consistent with the County GMP.
	o Odor problems from applied wastewater and deposited solids during the drying cycle of the RIBs.*	o Proper design, operation and maintenance; high level of treatment; buffer zones (reforestation program).**	
	o Property inundated due to groundwater mounding.	o Adjust system design criteria.	
	o Premature failure of existing septic systems and increased development costs for newer septic systems due to increase in groundwater table levels near RIBs.	o Careful selection of sites; adjust application rates.	
	o Decrease in property values in areas surrounding RIBs due to aesthetics, odors and noise.*	o Proper design, operation and maintenance; high level of treatment; buffer zones (reforestation program).**	
	o Increased wastewater budgets for construction and operation.	o Unavoidable - unless grant from source other than federal agencies is obtained.	
	o Long term operational problems for development on the RIB peripheral areas of Sites 5A, 5C and 5D (urban development pressure).	o Flexibility in choosing sites due to reduced area requirements.	
On-Lot Disposal/Citrus Irrigation/Rapid Infiltration Basins	o Increase in lake levels, though not anticipated to be as significant as the rapid infiltration basin or citrus irrigation/rapid infiltration basin alternatives.	o Careful selection of sites; adjust application rates.	o WW flow reduced or eliminated to Shingle Creek.

TABLE III-3

Summary of Major Findings

Effluent Disposal Alternatives
(Continued)

Alternative	Potential Adverse Impacts	Mitigative Measures	Beneficial Impacts
On-Lot Disposal/Citrus Irrigation/Rapid Infiltration Basins	o Increase in nutrient loadings to lakes via groundwater.	o Monitor groundwater periodically during operation of RIBs; modify operation as required.	o Less flow to RIBs reduces land requirements; only well-suited sites are chosen. o Recharge and potentiometric increases in the Floridan aquifer.
	o Increase in sediment and nutrient loading to surface waters due to an increase in groundwater table levels and subsequent increase in surface runoff rates.	o Reduced area requirement allows use of only the more desirable irrigation or RIB sites remote from lakes.	o Increase in citrus production. o Reduction in overall land acquisition cost for land application of renovated wastewater.
	o Potential for sinkhole development increased though not anticipated to be as significant as the rapid infiltration alternative.	o Unavoidable - low probability of damage due to location in rural areas.	o Maintaining agricultural use of private property would become more attractive to growers; property retained on County tax rolls.
	o Increase in the variation of the natural annual cycle of lake levels - prohibits the development of new rooted aquatic vegetation or wetlands, causing a reduction in animal and fish communities.	o Careful selection of sites; adjust application rates.	o Increase in recreational values due to lake level increases. o Enhancement of marginal wetland areas due to increase in lake levels.
	o Odor problems from applied wastewater and deposited solids during the drying cycle of the RIBs.*	o Proper design, operation and maintenance; high level of treatment; buffer zones (reforestation program).**	o Possible reduction in the cost of citrus fruit production. o Provides an open space/greenbelt area consistent with the County GNP.
	o Increase in wastewater budget due to construction and operation.	o 55%-75% of the capital cost of centralized systems could be potentially funded by an EPA grant.	
	o Property inundated due to groundwater mounding.	o Adjust system design criteria.	
	o Premature failure of existing septic systems and increased development costs for newer septic systems due to increase in groundwater table levels near RIBs.	o Careful selection of sites; adjust application rates.	
	o Decrease in property values in areas surrounding RIBs due to aesthetics, odors and noise.*	o Proper design, operation and maintenance; high level of treatment; buffer zones (reforestation program).**	

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TABLE III-3

Summary of Major Findings

Effluent Disposal Alternatives
(Continued)

Alternative	Potential Adverse Impacts	Mitigative Measures	Beneficial Impacts
On-Lot Disposal/Citrus Irrigation/Rapid Infiltration Basins	o High density septic tank usage in low and medium potential soils, causing an increase in nitrogen and phosphorus loadings to groundwater and lakes.	o Proper site selection, design, operation and regulation.	

Abbreviations

WW - Wastewater
GMP - Growth Management Policy
RIBs- Rapid Infiltration Basins

* Determined to be a significant issue during the citizen review process.

** Mitigative measure developed by 201 consultants in response to concern.

CHAPTER FOUR

SELECTION AND DESCRIPTION OF PREFERRED ALTERNATIVE

A. BASIS OF DECISION

This section will summarize the factors which led to the selection of the preferred wastewater management alternative. The decision to select the preferred alternative rather than one of the other alternatives was made on the basis of cost-effectiveness , anticipated operational reliability and flexibility, and environmental suitability.

A.1 Cost-Effectiveness

Generally, EPA regulations allow a wastewater management alternative to be considered cost-effective if its present worth (life-cycle) costs are within ten percent of the least cost alternative and would not result in significant degradation of the environment. Other evaluative factors are also included in a cost-effectiveness analysis. As discussed in Chapter II of this EIS, there were eight wastewater management alternatives which were determined to have equivalent (less than 10% difference) present worth costs. Because it was concluded that the environmental impact evaluation did not result in the identification of potentially over-riding adverse impacts for any of the alternatives, any one of the eight least cost alternatives could have been selected for implementation.

The preferred alternative was not the least cost alternative. Therefore, cost was not the primary basis for the selection of the preferred alternative. Instead, operational flexibility and environmental concerns were major reasons for selection of the preferred alternative. Implementation of the combined citrus irrigation/rapid infiltration disposal option provides the beneficial reuse of the renovated wastewater by citrus irrigation, while maintaining the flexibility and reliability of an alternate disposal method. Environmental considerations which were important in the selection of the preferred alternative are discussed in the following section.

A.2 Important Environmental Considerations

Two important differences were notable among the least cost alternatives. These were with respect to: (1) the effluent disposal method; and (2) the number of treatment facilities utilized. Six of the eight least cost alternatives included a three plant configuration, with one of the three plants being the potential new Northwest Subregional Facility. This facility was to be located outside the Urban Service Area and foreseen to be a source of developmental pressure and possible secondary growth in the Rural Service Area. Although the two plant configuration was selected because it does not require the design of a new treatment plant and limits the effluent disposal to one geographical area, its selection also eliminated the greatest potential for induced growth outside the designated Urban Service Area.

The combined citrus irrigation/rapid infiltration disposal option provides for the beneficial reuse of renovated wastewater associated with citrus irrigation. It also reduces the impact of the operation of the rapid infiltration basins (RIBs) on water table and lake levels, reduces the amount of land required for the RIBs, and minimizes the amount of storage required for citrus irrigation.

In general, the alternatives evaluation (Chapter III) determined that the alternative selected has the least potential for resultant environmental impact of all of the alternatives evaluated. As with all of the land application alternatives considered in the 201 Facilities Plan, predominately beneficial impacts to area water resources are anticipated due to project implementation. The selected alternative will, most notably, eliminate the two most significant point source discharges to the Shingle Creek/Lake Tohopekaliga drainage area, and result in the recharge of area aquifers, including the Floridan. As a result of the project, a decreased eutrophication rate of Lake Tohopekaliga is anticipated and a significant amount of high quality renovated wastewater will recharge one of the area's most important water resources, the Floridan Aquifer. Although potential adverse impacts to water resources (e.g. excessive water table and lake level increases, lake water quality degradation, etc.) have been identified to be associated with the selected alternative in the previous chapter, subsequent evaluations and mitigative measures (see Section C of this chapter) incorporated into the design and operation of the project have effectively dealt with these concerns. The selected plan is expected to have the least adverse impact on area water resources of the alternatives considered, and result in a significant net beneficial impact on the water resources of the County and region.

B. DESCRIPTION OF THE PREFERRED ALTERNATIVE

B.1 Service Areas/Interceptors

The Southwest Orange County 201 Planning Area is segregated into three distinct service areas:

- o Sand Lake Road Service Area
- o McLeod Road Service Area
- o Rural Service Area

These service areas are depicted in Map IV-1.

The Sand Lake Road Service Area encompasses approximately 15,000 acres. Design flow projections include allowances for residential, commercial and industrial contributions, as well as nonexcessive infiltration and inflow to the collection system. Industrial wastewater flows are low in strength because the major industries pretreat their flows prior to discharge to the County system.

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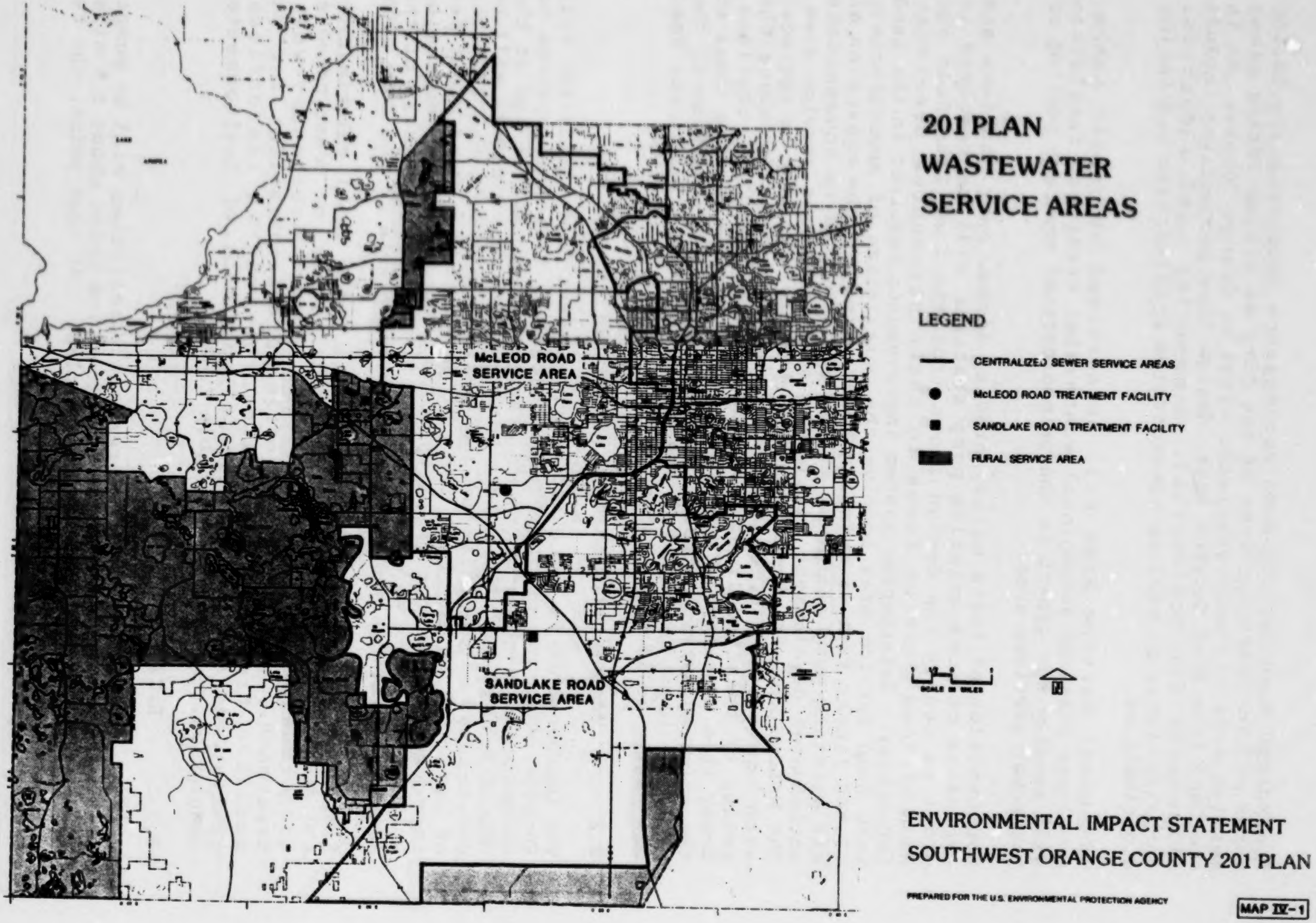

McLEOD ROAD
SERVICE AREA
SANDLAKE ROAD
SERVICE AREA
LEGEND
CENTRALIZED SEWER SERVICE AREAS
McLEOD ROAD TREATMENT FACILITY
SANDLAKE ROAD TREATMENT FACILITY
RURAL SERVICE AREA
SCALE IN MILES
N
MAP IV-1

201 PLAN WASTEWATER SERVICE AREAS

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

The McLeod Road Service Area encompasses approximately 38,000 acres and includes portions of the City of Winter Park's sewer service area and unincorporated areas of Orange County. As in the Sand Lake Road Service Area, design flow projections include allowances for residential, commercial, and industrial contributions, as well as nonexcessive infiltration and inflow contributions.

The Rural Service Area will be serviced by septic tanks. Developer financed subregional wastewater treatment facilities will service new growth in the unincorporated southern portion of the sewer services area.

Construction of force mains, gravity lines, pump stations and expansion of some existing pump stations will be required in order to convey the design flows from the Sand Lake Road and McLeod Road Service Areas to their respective treatment facilities. Interceptor system improvements required in the Sand Lake Road Service Area involve the paralleling of approximately 17,900 linear feet of existing force mains and the expansion of six existing pump stations. These are required to accommodate anticipated development within the existing sewer service area. The McLeod Road Service Area interceptor system will be upgraded with new gravity lines and force mains, primarily along the routes of existing lines, and new or expanded lift stations. Sewer line capacity deficiencies currently exist in some areas of the existing service areas. Map IV-2 shows the locations of the proposed improvements for the McLeod Road and Sand Lake Road wastewater collection system.

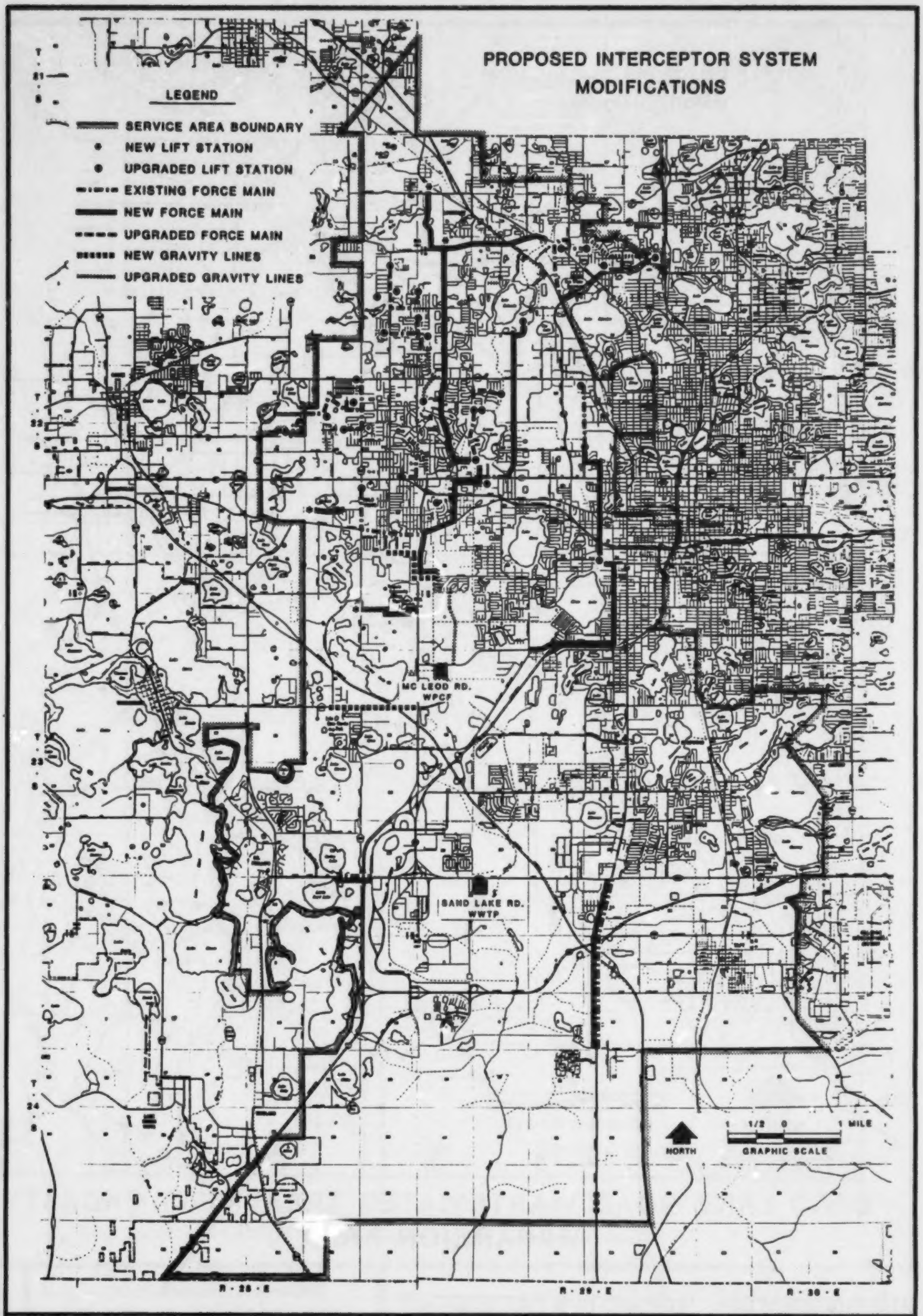
B.2 Wastewater Treatment Facilities

The improvements to the existing sewage treatment facilities will include expansion of the present secondary treatment systems to accommodate 23 mgd at the Sand Lake Road plant and 21 mgd at the McLeod Road plant. The McLeod Road facility improvements will be constructed on the existing plant site. An additional 26 acres of land will be acquired south of the Sand Lake Road plant for improvements to that facility. The location of the expansion area is shown on Map IV-3. Table IV-1 gives a summary of the design populations and flows for the two plants in the Year 2000.

Flow equalization, dual media filters, high level chlorination, and additional sludge handling facilities will be constructed at each treatment plant to provide advanced secondary waste treatment. The projected effluent concentrations for the modified treatment facilities, as well as the effluent limitations set by the Florida Department of Environmental Regulation, are depicted in Table IV-2.

B.3 Effluent Disposal

The effluents from the two treatment facilities will be pumped through 42-inch force mains to a junction point about 1.5 miles west of the McLeod Road treatment plant. At that point, the two

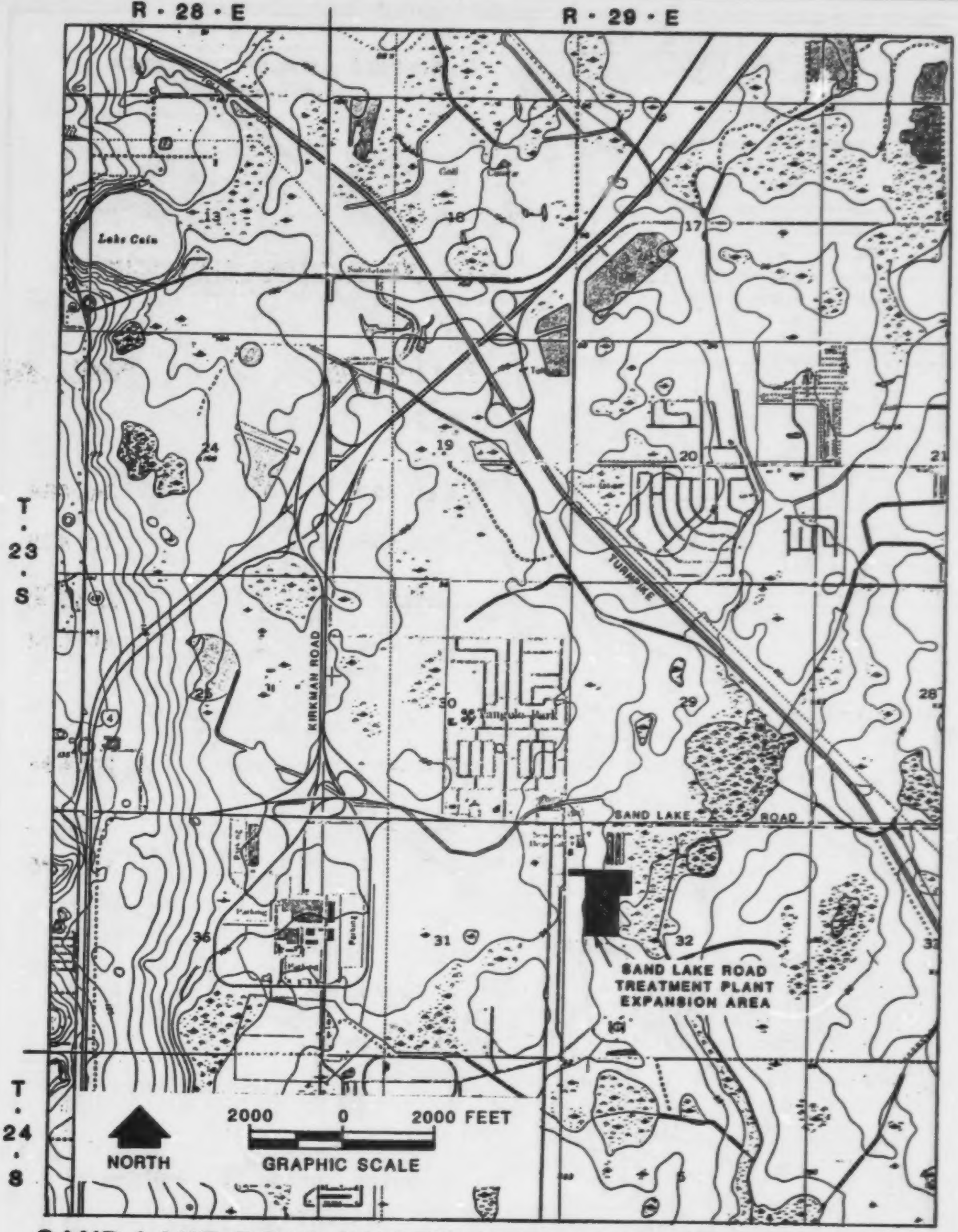

LEGEND
SERVICE AREA BOUNDARY
NEW LIFT STATION
UPGRADED LIFT STATION
EXISTING FORCE MAIN
NEW FORCE MAIN
UPGRADED FORCE MAIN
NEW GRAVITY LINES
UPGRADED GRAVITY LINES
MC LEOD RD. WPCF
SAND LAKE RD. WWTP
NORTH
1 1/2 0 1 MILE
GRAPHIC SCALE
T 21 S
T 22 S
T 23 S
T 24 S
R 28 E
R 29 E
R 30 E

PROPOSED INTERCEPTOR SYSTEM MODIFICATIONS

MAP IV-2

ENVIRONMENTAL IMPACT STATEMENT SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
BY MAYES, SUDDERTH & ETHEREDGE


R · 28 · E
R · 29 · E
T · 23 · S
T · 24 · S
Lake Cain
13
16
17
19
20
21
24
25
28
29
30
31
32
36
Tangelo Park
KIRKMAN ROAD
TURNPIKE
SAND LAKE ROAD
SAND LAKE ROAD TREATMENT PLANT EXPANSION AREA
NORTH
2000
0
2000 FEET
GRAPHIC SCALE

SAND LAKE ROAD WASTEWATER TREATMENT FACILITY EXPANSION AREA

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

PREPARED FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY BY MAYES, SUDDERTH & ETHEREDGE

MAP IV-3

TABLE IV-1

SUMMARY OF YEAR 2000 DESIGN POPULATIONS AND FLOWS

SERVICE AREA	POPULATION	FLOW, MGD
McLeod Road		
City of Orlando	80,793	11.094
Orange County	66,453	8.479
Winter Park	7,010	.929
Total	154,256	20.502
Sand Lake Road		
Orange County	133,456	22.634
Total	287,712	43.136

Source: Southwest Orange County, Florida, 201 Facilities Plan, Draft, Orange County and City of Orlando, October 1983

TABLE IV-2

RAPID INFILTRATION BASIN DESIGN EFFLUENT QUALITY STANDARDS

Parameter	FDER Limits	Projected Concentration (mg/l)	
		Average	Maximum
TSS	20	4	5
BOD_5	20	10	20
Total Phosphorus	--	4	4
Total Nitrogen	--	16	20
Nitrate-Nitrogen	12	2	8
pH	6-8.5	7	8.5

Source: Rapid Infiltration Basins Design Development Report; Camp Dresser & McKee, Inc.; April 1984.

lines will be joined and a single 54-inch pipeline will be constructed to the distribution center in West Orange County. The route of the 15.5 mile force main is shown on Map IV-4.

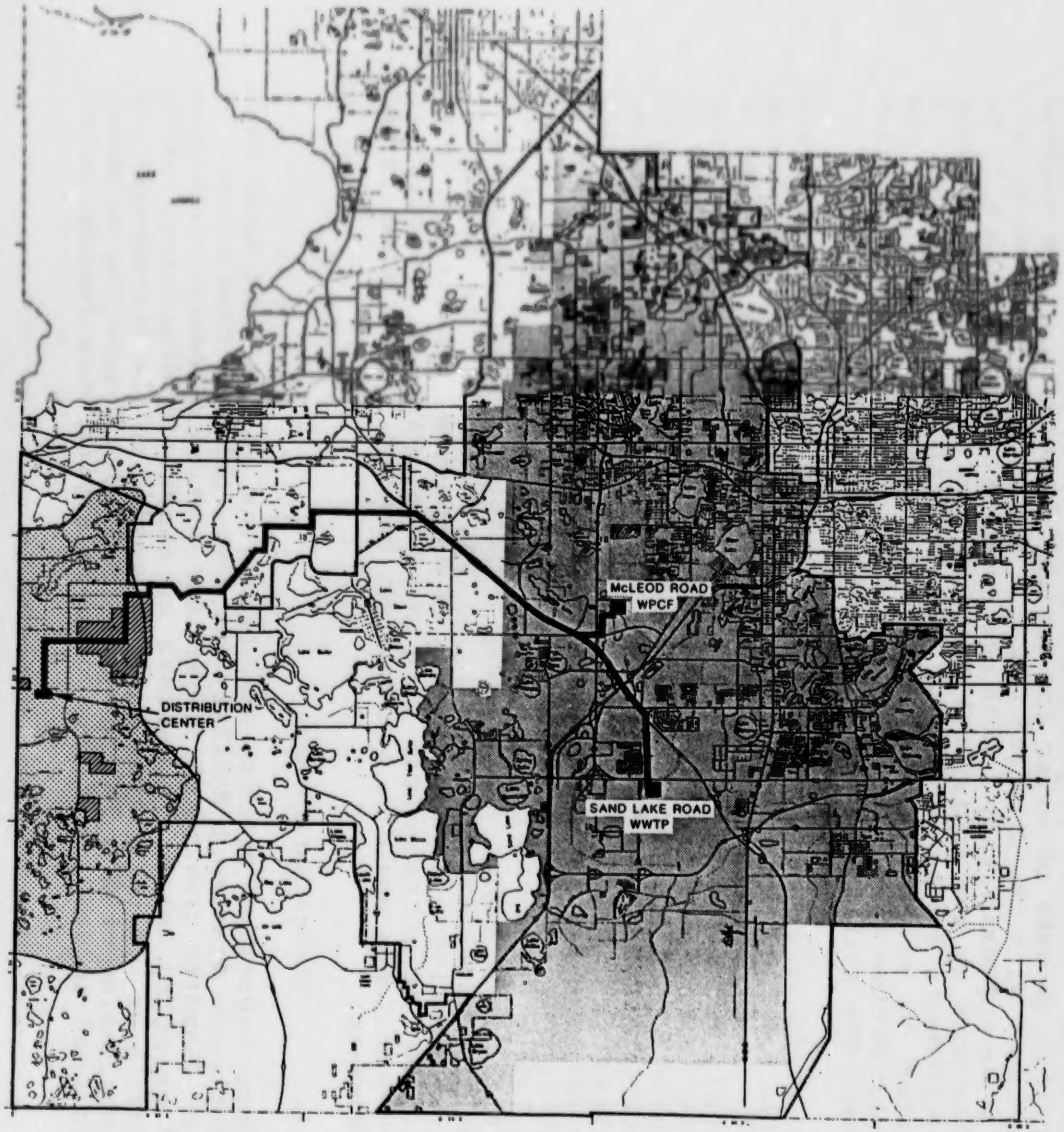
At the distribution center, 20 million gallons of storage will be provided and flows will be routed into the citrus irrigation distribution network or rapid infiltration basins as demand requires. At the time of this writing, commitments by grove owners to receive renovated wastewater total 20.9 mgd. This demand has been estimated to increase to an average of about 30 mgd by the Year 2000. The actual demand will be determined by the number of growers participating in the project. Any excess flow will be routed to the rapid infiltration basins. The target area for citrus irrigation is Southwest Orange County and Southeast Lake County. A network of pipelines will be constructed to carry the reclaimed effluent to citrus grover within the target area. Map IV-5 shows the target area boundary for the citrus distribution system and the initial alignment of the distribution pipeline. Growers participating in the program will receive specific amounts of water for irrigation according to a written agreement with the City and County. The average application rate will be approximately 1 inch per week. The actual rate will be determined by the individual growers, due to variations in flow requirements during periods of extended rainfall or drought. A system of wells will be constructed along the route of the distribution system to satisfy peak irrigation demands which exceed the availability of renovated wastewater.

The rapid infiltration basins (RIBs) will be constructed on RIB Sites 5,6,7 and 9 as shown in Map IV-6. Because the transmission main passes through Site 6, take-off piping will be installed to supply effluent directly to the site, thus bypassing the distribution center. The take-off piping will be designed to handle a peak flow of 75 mgd in order to provide for disposal of effluent during emergency peak flow conditions. Average loading estimates for each site are shown in Table IV-3. The RIBs will be designed for infiltration rates of up to 6.4 inches per day, with provisions for a wetting period of 7 days and drying period of 7 days. The RIB berms outside of the basins will be sodded with Bermuda grass, and a spray irrigation system will be added for disposal of effluent. In addition to the aesthetic considerations, Bermuda grass, if harvested, can utilize up to 400 lbs. of nitrogen per acre per year. Minimal reduction in nitrogen loads would be anticipated, however, if the grass is not harvested.

B.4 Sludge Management

Improvements or process modifications at the Sand Lake Road Wastewater Treatment Facility include: chlorine feed to two 95 foot diameter gravity thickeners for control of odors; conversion of existing aerobic digesters to anaerobic digesters, which operate as closed systems with no venting to the atmosphere; and installation of four belt presses for sludge dewatering to reduce the need to dewater sludge on open drying beds during normal

SELECTED PLAN


McLEOD ROAD
WPCF
SAND LAKE ROAD
WWTP
DISTRIBUTION
CENTER

LEGEND

— PLANNING AREA

▇ URBAN SERVICE AREA

━ TRANSMISSION MAIN

▒ CITRUS IRRIGATION TARGET AREA

▨ RIB SITES

SCALE IN MILES

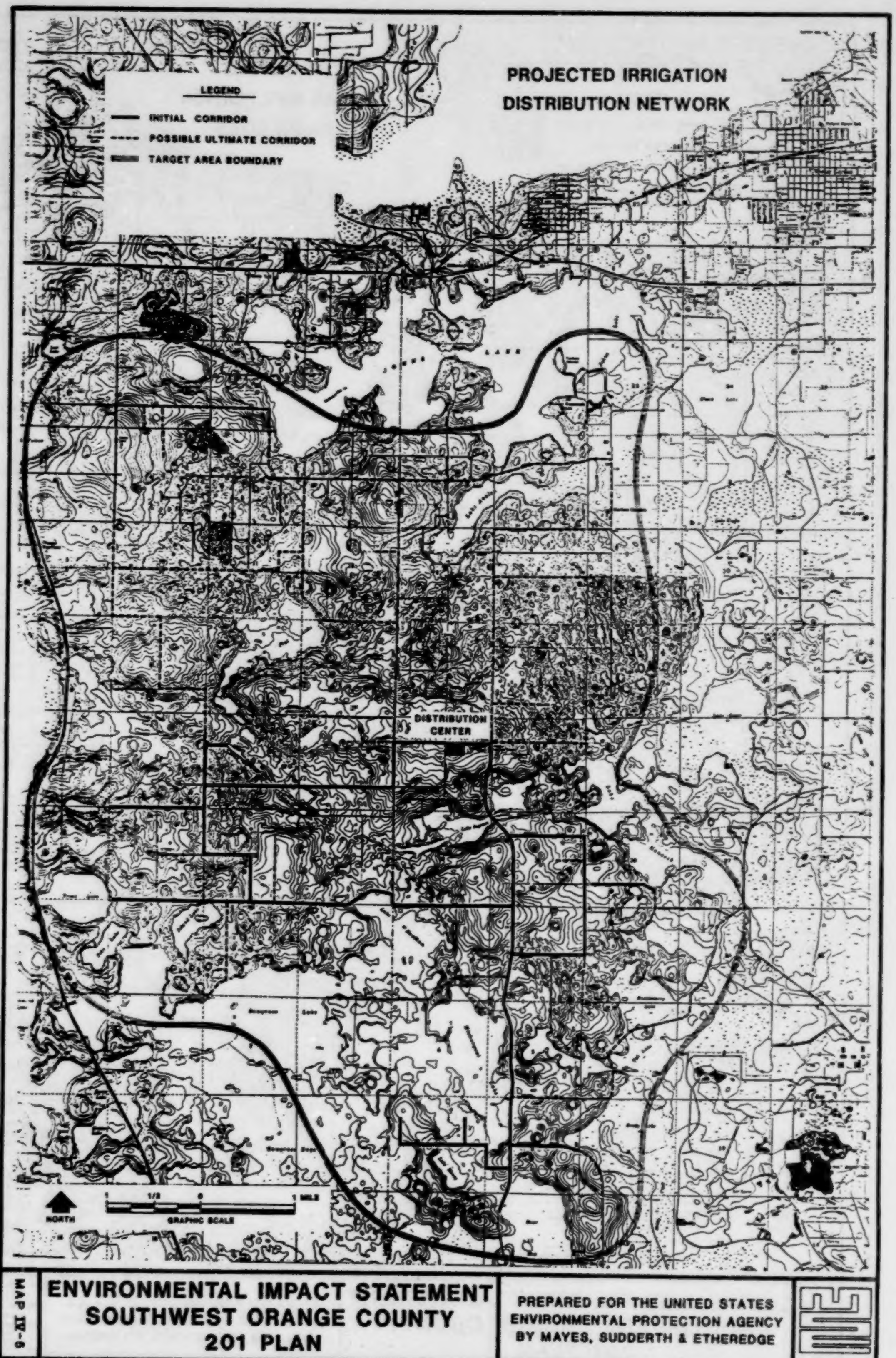
N

ENVIRONMENTAL IMPACT STATEMENT

SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

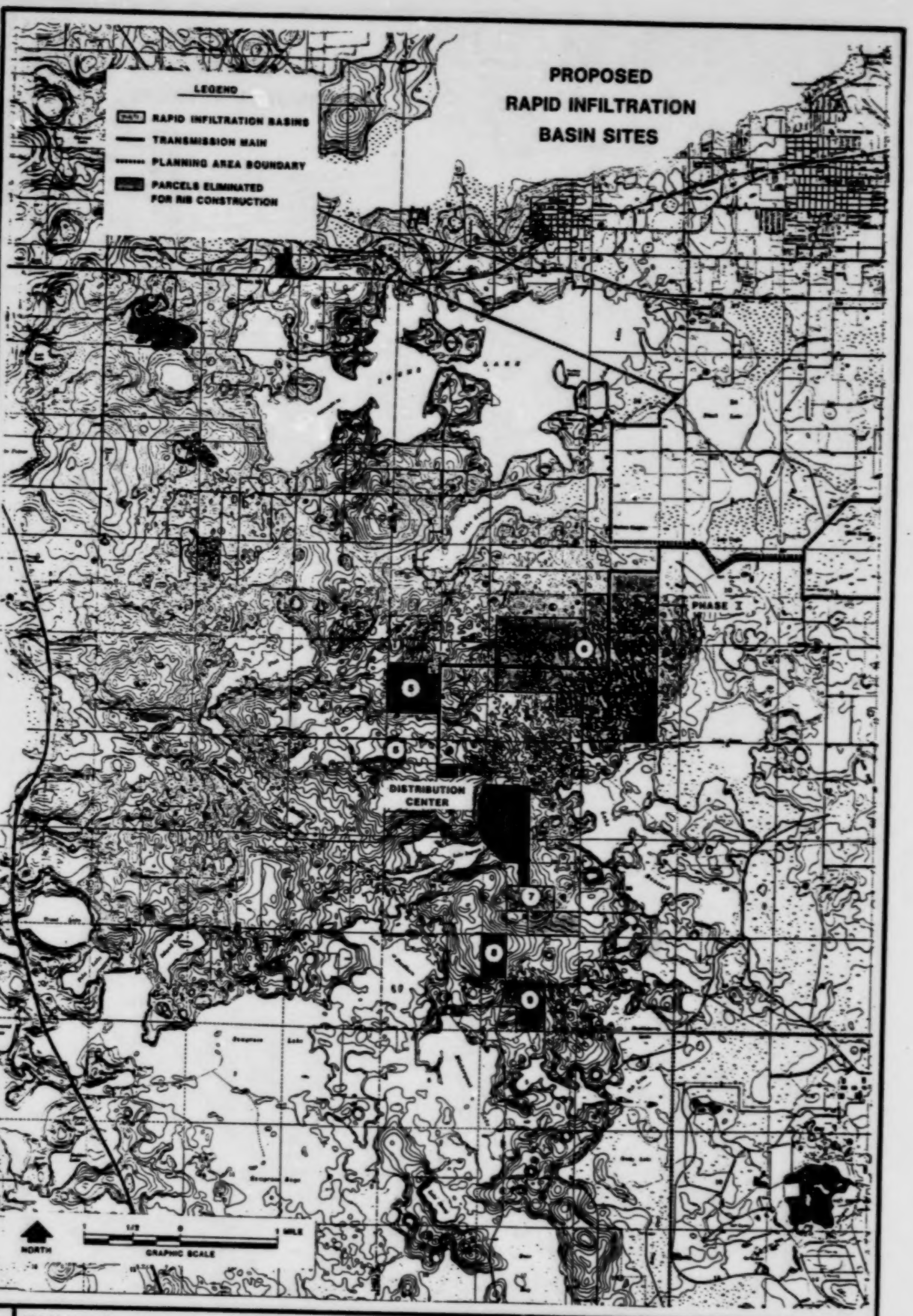
MAP IV-4


PROJECTED IRRIGATION
DISTRIBUTION NETWORK
LEGEND
INITIAL CORRIDOR
POSSIBLE ULTIMATE CORRIDOR
TARGET AREA BOUNDARY
DISTRIBUTION CENTER
NORTH
1 1/2 0 1 MILE
GRAPHIC SCALE

MAP IV-6

**ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN**

PREPARED FOR THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
BY MAYES, SUDDERTH & ETHEREDGE



PROPOSED RAPID INFILTRATION BASIN SITES

LEGEND
RAPID INFILTRATION BASINS
TRANSMISSION MAIN
PLANNING AREA BOUNDARY
PARCELS ELIMINATED FOR RIB CONSTRUCTION
PHASE I
DISTRIBUTION CENTER
7
NORTH
1 1/2 0 1 MILE
GRAPHIC SCALE

MAP IV-8

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY
201 PLAN

PREPARED FOR THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
BY MAYES, SUDDERTH & ETHEREDGE

TABLE IV-3

RIB SITE DESIGN DATA

SITE	AVERAGE FLOW (MGD)
5	1.03
6	10.22
7	3.14
9	1.49
Total	15.88

Source: Rapid Infiltration Basins Design Development Report; Camp Dresser & McKee, Inc.; April 1984.

operations. In addition, the solids removal equipment for the secondary clarifiers will be modified to provide for uniform withdrawal of sludge. Stabilized solids will be trucked to the Orange County Model Landfill for final disposal.

At the McLeod Road Water Pollution Control Facility, two strategies for sludge handling are being considered. The first would involve odor control, thickening, anaerobic digestion, belt press dewatering and landfilling of sludge, all to be accomplished by the City of Orlando. The second strategy being considered is the privatization of sludge handling operations at City treatment facilities whereby a full service vendor would provide long-term sludge handling and disposal operations for the City. Privatization could eliminate, modify or delay construction of facilities that are currently under design for the first approach. It is unknown at this time which sludge management strategy will be implemented at the McLeod Road facility.

C. ENVIRONMENTAL IMPACTS OF THE PREFERRED ALTERNATIVE

C.1 Surface Water Resources

Implementation of the selected plan will eliminate the direct discharge of effluent to Shingle Creek and should result in a decreased rate of eutrophication in Lake Tohopekaliga. While this accomplishes one of the primary objectives of the Southwest Orange County 201 Facilities Plan, the potential effects of the proposed action on other surface water resources were also evaluated. Lakes are the primary surface water resource of concern in the 201 Planning Area because they are natural resources of important economic and recreational value. They also serve as direct sources of recharge to the area's potable aquifers.

Lake Levels

The average annual elevation of lakes located near the proposed RIBs are expected to increase after RIB operation begins because of the additional recharge to the water table aquifer. This may result in relatively high lake levels during some unusually wet years. However, Orange County has adopted a policy which will prevent loading RIBs near lakes when those lakes approach their 100-year flood level. With the proposed operational procedures, wastewater would be diverted to citrus irrigation or to RIBs located further from lakes. Therefore, it is not anticipated that RIB operation will cause flooding of lands which would not have been flooded under pre-construction conditions. More frequent or continuous lake level monitoring may be required to effectively implement the operational objectives, and RIB loading rates can be adjusted accordingly. Beneficial impacts will occur to Lakes Avalon, Ingram and Johns. These lakes have been at lower than normal elevations during recent years, and a rise in their levels should increase their recreational usefulness.

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Lake Water Quality

The potential impact on the water quality of lakes in the region due to RIB operation is not expected to be significant. Five of the six lakes nearest to the RIB sites (Lakes Hancock, Hartley, Speer, Johns and Avalon) appear to be phosphorus limited. These lakes would be sensitive only to changes in phosphorus concentrations, and not to changes in nitrogen concentrations. Because an excess of nitrogen is already available in these lakes, an increase in nitrogen levels would have no impact on the rate of vegetative growth. Lake Black is apparently not phosphorus limited, but may be light limited, and therefore, not sensitive to nutrient enrichment.

A comparison of water quality in lakes and water table aquifer shows that the concentration of total nitrogen in the water table aquifer and in lakes is in the same approximate range. Most of the nitrogen entering lakes from the water table aquifer remains available in the water column for the growth of aquatic vegetation. An increase in the concentration of nitrogen in the water table aquifer could be expected to result in a nearly equal increase in nitrogen concentrations in lakes. A comparison of phosphorus concentration shows the phosphorus concentration of the water table aquifer to be ten times that of lakes. It appears that most of the phosphorus entering lakes from the water table aquifer is rapidly consumed by algae and aquatic vegetation, and therefore, not measureable in lake waters. This further substantiates the assumption that the lakes are phosphorus limited.

As stated above, nitrogen enrichment is not anticipated to be a problem, even though nitrogen levels will increase above current levels. The concentration of phosphorus in the water table aquifer is not expected to increase as a result of RIB operation, and may possibly decrease due to the advanced secondary treatment of the wastewater. Because the phosphorus concentration of groundwaters reaching lakes is not expected to be increased, it is predicted that eutrophication of these lakes will not be accelerated and no significant deterioration of water quality is expected to occur.

C.2 Groundwater Resources

Groundwater Levels

Groundwater movement in southwest Orange County is three-dimensional due to the hydraulic connection of the Floridan aquifer and the water table aquifer. A three-dimensional USGS model was utilized in developing the 201 Facilities Plan to predict the mounding anticipated to occur with the initiation and continued operation of wastewater disposal operations at the proposed RIB sites. From the results of this model, it was estimated that only a slight rise will occur in the potentiometric surface of the Floridan aquifer. A rise of a few feet in the potentiometric surface is not considered a significant impact.

The elevation of the surficial aquifer, which consists of the upper soils of the region, will be increased in some areas as compared to its normal level, due to RIB operations. The maximum elevation of the water table will be closer to the land surface beneath the RIB sites and in the immediately adjacent areas. In addition, it is expected that the elevation of the water table will vary more frequently and more rapidly as a result of RIB operation. However, based upon hydrogeologic mathematical models prepared for the area, it is not expected that the shallower water table created will significantly affect existing agricultural activities or other land uses on properties adjacent to the RIB sites.

Groundwater Quality

Minor changes in the quality of groundwaters in the area may occur due to RIB operation, but are generally not expected to be significant. For example, the average concentration of some chemical constituents, such as nitrogen, may be increased in the groundwaters near the RIB sites. However, no significant impacts on the quality of these waters is anticipated because these constituents are expected to meet water quality standards at the site boundaries. Based on data obtained during the 201 Planning studies, the treated wastewater effluents from the Sand Lake Road and McLeod Road treatment plants presently meet all primary and secondary drinking water standards except for coliforms, turbidity and iron. In addition, both the City and County have developed industrial pretreatment programs to monitor and control the discharge of industrial wastes into the sanitary sewer systems.

The concentration of nitrogen in the groundwaters directly below RIBs may increase to levels somewhat above those allowed for drinking water. However, it is anticipated that mixing with other groundwaters and percolating rainwater will occur and reduce these concentrations to a level which will meet drinking water standards. RIB Site 5 will be used for testing operational procedures to control nitrate nitrogen levels in the groundwater.

A continuous monitoring program, as required by the FDER, will be implemented to assure that the quality and elevation of the groundwater are not significantly affected by the project. If adverse impacts to the groundwater occur, further impacts could then be avoided by reducing the RIB loading rates or changing operational procedures.

The groundwater monitoring program has been designed to assess the impact of the hydraulic loading of individual Rapid Infiltration Basins (RIBs) on the surficial and Floridan aquifer systems. The monitoring well network will be constructed prior to the start of construction of the RIBs and will be designed to measure water elevation and water quality changes within each RIB site. Background water quality and water elevation data will be monitored during the RIB construction period and prior to the start of hydraulic loading of each RIB site. Background data will be monitored in a series of surficial and deep monitoring wells. Following the start of operations at each site, background water quality data will continue to be monitored hydraulically upgradient from the area of disposal at each site.

Additional monitoring wells will be provided along a boundary which is defined by the zone of discharge around the periphery of each RIB site and at several other interim points within the zone of discharge. The zone of discharge for each RIB "site" as defined by Chapter 17-4 of the Florida Administrative Code (F.A.C.) is defined by a line which is located 100 feet outside the outer most boundary of the individual RIBs within each area (e.g., Sites 5, 6, 7 and 9).

The primary monitoring system for each RIB site is comprised of a network of shallow monitoring wells within the upper surficial aquifer. Individual wells are located along the outer zone of discharge for each site in order to intercept the flow of effluent from individual RIBs to offsite areas and provide measurement of water quality impacts. The hydrogeology of the area indicates that both external, offsite drainage and internal onsite drainage is to be expected. Therefore, additional intermediate monitoring wells have been provided within the zone of discharge to monitor any anticipated drainage through topographically low depressional areas into the deeper Floridan aquifer system. This concept of the monitoring program recognizes that for internally drained sites, the zone of discharge must be defined in a vertical as well as horizontal orientation.

The impact of the hydraulic loading of individual RIBs on the surficial groundwater system is measured in both water quality and water elevation changes. In order to monitor the changes in water elevation and to provide essential data to control the operation and loading of individual cells throughout each property, additional 2-inch monitoring wells have been provided within each RIB site. In general, these wells are located along potentiometric ridge lines and will be used to measure the change in water table elevation which has a direct bearing on operational decisions. Several low lying depressional areas are found within each RIB site, many of which contain water year-round. In order to monitor the change in surface water elevation, staff gages will be provided within the predominant depressional areas. The staff gages will be used to measure water elevation changes and to provide input to operational decisions regarding the loading of individual cells.

Although the Floridan aquifer is considered to be outside the zone of discharge for each RIB site, as defined under Section 17-

4 F.A.C., monitoring wells in the Floridan aquifer will be provided to measure water quality and water level changes. Existing wells in the Floridan aquifer at Sites 5, 6 and 7 will be used for measurement of water quality and water level changes. A new 4-inch diameter monitoring well will be constructed hydraulically downgradient from Site 9, also to measure water level and water quality changes. In addition, existing wells within the Floridan aquifer upgradient from Site 9 and downgradient of Site 6 will be monitored on a regular basis to detect any water quality changes at a regional scale.

Groundwater monitoring is not planned in the citrus irrigation areas. Based on an agreement with FDER, the quality of the water leaving the distribution center site will be monitored for pH, fecal coliform and chlorine residual. However, if groundwater monitoring at the RIB sites indicate water quality degradation, monitoring in the citrus irrigation sites will be initiated. This strategy is based on the fact that if there are not problems at the RIB sites, where the loadings are greatest, then there should be no problems in the citrus irrigation areas, where loadings are minimal.

The University of Florida Institute of Food and Agricultural Sciences (IFAS) will conduct a monitoring program to determine the impacts of the irrigation on citrus production. This program will include an evaluation of the chemical characteristics of the citrus leaves, fruit and soil during irrigation. Water quality will be monitored at the point of application to the citrus groves.

C.3 Land Resources

The environmental assessment of the proposed construction and operation of the wastewater transmission, treatment and disposal facilities involved three aspects of land resources, i.e. topography, soils and geology. Only one impact was determined to be potentially significant. This concerned the potential for causing or increasing the likelihood of the formation of sinkholes.

Evaluations of Sites 5,6,7 and 9 show the greatest potential for sinkhole formation at Site 6. The geology of Site 6 contains variable overburden thickness, Hawthorn thickness and Hawthorn competency (competency of the Hawthorn Formation is based on the number of blows per foot of a penetrating drill). Site 6 contains a number of remnant sinkholes, and small and large enclosed depressions. Groundwater modeling indicates that the water table beneath the site will be raised by about 30 percent above normal levels, causing an increase in the head differential with the confined aquifer and an increase in the load on the subsurface strata. However, if a sinkhole should develop, it is not expected to create a significant impact. Most of the past sinkhole activity associated with Site 6 has occurred in the far eastern portion of the site, where the nearest residents are greater than one-half mile from active disposal sites. If a sinkhole should occur in a basin during an application cycle, a relatively small volume of water could enter the aquifer directly. However, because of the high quality of the treated effluent, no significant impacts on groundwater quality would be expected.

C.4 Ecological Resources

Ecological field surveys were conducted to determine the impacts which might occur due to construction and operation of the proposed wastewater treatment, transmission and disposal systems. These field surveys identified the major plant and animal communities, as well as the presence or absence of rare, endangered or threatened species in the affected area. Based on evaluations of the findings, no rare or endangered species will be affected, and it is anticipated that no long-term significant ecological consequences pertaining to construction or operation will result.

The gopher tortoise, a species of special concern, may be temporarily affected during construction in that the burrows of a few individuals are located in the vicinity of the proposed transmission corridor. Relocation of these individuals may be necessary if the construction affects their burrows. Various types of natural vegetation may be removed or disturbed during construction of the transmission system. The areas disturbed can be replanted with the appropriate species, to minimize the extent of the impacts.

The operational impacts associated with groundwater and lake elevation changes may also cause a short-term ecosystem adjustment. This is not necessarily an adverse impact, as the changes will gradually occur over a long period of time. In addition, the plant and animal communities will be able to adapt to the water level changes. The water level changes are generally expected to be less than two feet and are not expected to alter the seasonality of the present water fluctuations. The operational flexibility of the preferred alternative will also permit the avoidance of changed water level patterns, should they subsequently threaten to cause ecological impacts.

These conclusions differ from the findings reported in the previous chapter of this EIS, which were based on preliminary modeling efforts, as developed during the alternatives evaluation process, which predicted substantial groundwater level increases. Groundwater modeling efforts were subsequently refined during the design of the selected alternative. The impacts on lake levels and water table elevations based on the refined models were substantially less than those predicted by the earlier models. Therefore, the potential for adverse impacts to ecological resources would not be as great as predicted previously.

C.5 Population and Land Use

The proposed project conforms to existing and planned land uses and supports the goals and objectives of the Orange County and City of Orlando Growth Management Policies (GMPs). Although specific segments of the proposed interceptor system could cause induced growth, the planned phasing of the system should be adequate to control this potential growth. In addition, should induced growth occur, it would have to conform with the recommended densities of the adopted GMP. Therefore, no significant adverse impacts related to conformance with existing or planned land uses are anticipated as a result of implementation of the proposed project.

During construction and operation of the selected plan, disruption of existing land uses is anticipated to be the most prevalent type of potential impact to occur. Normal short-term construction-related impacts such as disruption of traffic patterns, temporary access problems, and construction traffic, dust and noise will occur during construction of the project. These temporary impacts along segments of the interceptor and transmission systems are unavoidable, and may be mitigated to some extent, but are not anticipated to be of over-riding significance. With respect to interceptors, the impacts are considered to be necessary in order to avoid other potentially more significant secondary growth impacts which could occur if constructed in undeveloped areas.

Although the RIBs are located in areas of predominately agricultural or vacant lands, some impacts to existing land uses could occur. Disruption of an existing poultry farm adjacent to RIB Site 7 could occur due to construction or operation of the project. Project planning has included several modifications to reduce impacts to residents adjacent to RIB Site 6. Construction activities at the RIB sites are not anticipated to be significant. There are approximately 700 acres of active citrus groves on the RIB sites. Approximately 100 acres of active citrus will remain on the RIB sites after construction and will be leased for citrus management.

Operation of the RIBs may increase area lake levels. Although this could be a significant beneficial impact to some of these lakes, existing residential or agricultural areas could potentially be adversely impacted at specific lake levels. The effects of the project on water table and lake levels will be continually monitored by the County and City. The County has resolved to begin diverting wastewater to citrus irrigation or to other RIBs if lakes adjacent to operating RIBs come to within 18 inches of their 100-year flood level. In order to evaluate the potential impacts of increased lake levels, land uses with the 100-year flood plain of lakes adjacent to the RIB sites were located using aerial photos and limited field checks. No potential impacts to existing land uses within the Lake Avalon

100-year flood plain are anticipated. Small areas of citrus groves could be impacted in the 100-year flood plains of Lakes Johns, Speer, Hartley, Hancock, and Ingram. Residential structures located within the 100-year flood plains of Lakes Black, Johns and Ingram could also be potentially impacted. The extent of the impact, even if the lake levels were to rise to the 100-year flood level, cannot be determined because the elevation of the floor of these structures is not known. This is not considered to be a potentially significant over-riding impact because actual increases in lake levels cannot be adequately determined prior to operation due to variables such as the nature of potential citrus irrigation demand, weather conditions, and the actual hydrogeologic response to the RIB loadings. Also, the planned monitoring program combined with the operational flexibility of the proposed systems is expected to preclude significant impacts. More frequent monitoring of lake levels than the proposed quarterly readings may, however, be warranted.

C.6 Archaeological/Historical Resources

An archaeological and historical site survey and assessment was conducted in order to determine potential impacts of the selected alternative. As a result of this assessment, four previously unknown prehistoric sites were discovered. These sites represent short-term, special use camps or limited activity sites, and are relatively common in this and other archaeological regions. The sites are badly disturbed due to past planting and maintenance of citrus groves. It was determined that there are no significant prehistoric or historic sites eligible for inclusion in the National Register of Historic Places within the area designated for construction of the proposed project.

C.7 Air Quality/Odor/Noise

An analysis of the effects of the selected plan was undertaken to determine potential air quality, odor and noise impacts. Temporary, highly localized noise and dust impacts will occur due to construction, particularly in heavily developed areas along interceptor and transmission main routes. However, these impacts will cease after the construction phase, and will not create any long-term problems. Odor problems currently occur at the existing facilities, particularly at the treatment facilities, and design improvements are being made to reduce this impact. Upgrading of the facilities should reduce existing odor problems and, therefore, result in a positive impact. There are no significant adverse impacts anticipated related to air quality, odor or noise.

D. MITIGATIVE MEASURES

D.1 Proposed Mitigative Measures

Several mitigative measures have been incorporated during the development of the 201 Facilities Plan and design of the selected alternative. Implementation of these mitigative measures began during the alternatives evaluation process (e.g. revisions of RIB site areas in response to EIS and public concerns). Other mitigative measures are planned to further minimize the potential impacts. These measures are described in the following paragraphs.

D.1.1 Mitigation of Water Resource Impacts

Lake Levels

In order to avoid property damage due to lake level increases, it is recommended that detailed topographic surveys be conducted in potentially affected areas to adequately assess the effects of attaining 100-year flood levels. These surveys would determine whether significant property damage would occur if the lakes reached the 100-year flood level. Lake level monitoring is incorporated in project planning in order to control lake level impacts associated with operation of the RIBs. An Orange County Commission resolution requires that mitigative measures be initiated should lake levels rise above 18" below the 100-year flood level. In order to ensure that these measures, if required, are instigated immediately, it is recommended that continuous lake level monitoring should be considered. Continuous lake level recording to the operations center could enhance the flexibility of operations and/or provide useful data on the response of the lake levels to RIB loadings.

Groundwater Levels

Mitigative measures for impacts related to groundwater mounding were developed in response to: (1) meetings with Lake Avalon Home and Property Owners Association and other concerned citizen and interest groups; and (2) restrictions imposed by FDER. As a result of meetings with members of the Lake Avalon Home and Property Owners Association, design guidelines were developed and adopted by the Orange County Board of County Commissioners. These guidelines, which were incorporated into the RIB design, include measures that will minimize the impacts on the adjoining property owners. The wetted perimeter of the RIBs will be located not less than 100 feet from adjoining property lines, not less than 500 feet from Dangler Road, and not less than 500 feet east of the most western boundary of RIB Site 6.

Criteria established by the Florida DER also require that RIBs be operated in such a manner as to preclude the breakout or pooling of effluent in adjacent land areas at design loading rates. Therefore, if the design loading rates are found to result in seepage in low areas off the RIB sites, modifications will be required to the effluent loading rates to eliminate such occurrences. The County has developed a rigorous monitoring program to assure successful operation of the effluent disposal

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system. Included in the monitoring program are groundwater monitoring wells, effluent monitoring systems, the test basin and associated instrumentation, and fully operational meteorological stations at each site. In addition to these elements, the monitoring program also includes the use of a computerized management system called the "On-Going Management Tool" (OGMT). The OGMT is being developed in conjunction with the design of control systems for RIBs and will allow for operational modifications based on monitoring and flow control data.

Groundwater Quality

A monitoring program will also be implemented to measure changes in groundwater quality. The monitoring program will include periodic sampling of shallow groundwaters (i.e. within the upper 10-50 feet of soil). The proposed location for RIB monitoring wells are presented in the site-specific hydrogeologic reports prepared by Jammal & Associates, Inc. and contained in Appendix C to the Rapid Infiltration Basins Design Development Report, revised April 1984.

For up to one year prior to the start of the RIB operations, an initial monitoring of water quality in each well will be conducted. Sampling will be on a quarterly basis. Once operation of the RIBs commences, the water quality will be measured quarterly, possibly measuring different parameters from those of the initial monitoring program. The long-term monitoring program will be refined based on the results of the initial monitoring program. Additional parameters will be measured annually in order to permit a complete characterization of long-term groundwater quality changes. Table IV-4 lists the various parameters and their corresponding frequency of analysis. Ongoing evaluation of optimum operational procedures at the test basin will be used to refine and improve upon nutrient removal capabilities at the other RIB sites. Adequate storage is provided in the treatment facilities to insure that effluent pumped to the disposal system meets the requirements as specified in the growers' agreements. Inadequately treated effluent will not be discharged.

Lake Water Quality

Continuing surface water monitoring of Lakes Black, Hancock Hartley, Avalon, Ingram, Johns and Speer will also be accomplished by Orange County to identify any significant changes in water quality which might occur. Both shoreline and in-lake monitoring stations will be established at several points on all lakes in the vicinity of the RIB sites. Monitoring station locations will be fixed by an in-place water level staff gauge. In order to monitor the effect of RIB operation on lake water quality, a data base collected prior to construction of the RIBs will be used for information on background parameter levels. Monitoring stations on lakes upgradient of the RIB sites will provide additional background water quality data.

TABLE IV-4

GROUNDWATER MONITORING PARAMETERS

Parameter	Sampling Frequency Initially	 Quarterly	 Annually
Five-Day Biochemical Oxygen Demand	X	X	X
Chloride		X	X
Conductance	X	X	X
Coliform Bacteria	X	X	X
Nitrate Nitrogen	X	X	X
Nitrite Nitrogen	X	X	X
Ammonia Nitrogen	X		
Organic Nitrogen	X		
Total Nitrogen	X	X	X
Total Kjeldahl Nitrogen	X	X	X
Total Organic Carbon	X	X	X
Phosphorus		X	X
Total Dissolved Solids		X	X
pH	X	X	X
Temperature	X	X	X
Water Level	X	X	X
Priority Pollutants (including EDB)	X		X
Primary and secondary drinking water quality parameters (FDER Section 17-22.104), excluding radionuclides.	X		X

Source: Chapter 10; Rapid Infiltration Basins Design Development Report; Camp Dresser & McKee, Inc.; Revised, April 1984.

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While FDER regulations do not specify the surface water quality parameters to be monitored, for consistency those parameters listed in the groundwater monitoring requirements will be measured along with some additional parameters that are particularly indicative of surface water quality. These parameters are identified in Table IV-5. Initially, all parameters will be measured on a quarterly basis in order to quantify the seasonal variation in parameter values. Subsequent sampling frequency will be adjusted appropriately based upon initial results.

D.1.2 Mitigation of Ecological Resource Impacts

Construction

Mitigation of construction impacts involves minimizing the duration and total area of disturbance. The following specific suggestions are provided for mitigation: (1) minimize the destruction of plant and animal communities as much as possible; (2) revegetate disturbed areas quickly to avoid erosion and minimize disturbance of native species; (3) identify the presence of gopher tortoise burrows and attempt to relocate any individuals encountered in the construction zone to a habitat similar to that from which they were removed; and (4) enhance wildlife habitat adjacent to RIBs by selecting and planting vegetation recognized as beneficial for food and cover for wildlife. Revegetation of disturbed areas along the transmission corridor and at the RIB sites can be accomplished at little cost to provide the habitat requirements for wildlife. Table IV-6 lists selected plants which can be planted in Orange County.

Surface Water Levels

An increase in lake levels could result during operation of the RIBs and affect the existing natural vegetative areas. Monitoring, as described under Water Resources in the previous section, followed by adjustments in the design and/or operation of the RIB system, should prevent any significant permanent destruction of shore-line vegetation. Other mitigative measures involve efforts to: (1) avoid a permanent increase in water level of greater than 2.5 feet above the historical and natural pattern of water level variations; (2) schedule maximum increases of water level for early winter when the ecological effects are minimal; (3) avoid prolonged water level increases in the spring, March through June, to encourage germination and protection of seedlings; (4) maintain the relative pattern of seasonality in water level changes which is required for the diversity of the wetlands; and (5) monitor vegetation growth patterns annually to avoid significant increases in aquatic weeds such as water hyacinth.

TABLE IV-5

SURFACE WATER MONITORING PARAMETERS

Parameter
Alkalinity
Five-Day Biochemical Oxygen Demand
Chloride
Conductance
Fecal Coliform
Total Coliform
Dissolved Oxygen
Nitrate Nitrogen
Nitrite Nitrogen
Ammonia Nitrogen
Organic Nitrogen
Total Nitrogen
Total Kjeldahl Nitrogen
Total Organic Carbon
Orthophosphate
Total Phosphorus
Total Solids
Total Suspended Solids
pH
Temperature

Source: Chapter 10; Rapid Infiltration Basins Design Development Report; Camp Dresser & McKee, Inc.; Revised, April 1984.

TABLE IV-6

SELECTED WILDLIFE PLANTS FOUND IN CENTRAL FLORIDA[a]

WOODY PLANTS	UPLAND WEEDS AND HERBS	MARSH AND AQUATIC PLANTS
Pine (82)[b]	Fescuegrass (23)	Cattail (17)
Bald Cypress (3)	Bluegrass (30)	Pondweed (40)
Palmetto (9)	Bermudagrass (5)	Arrowhead (19)
Greenbriar (33)	Crabgrass (22)	Wild Celery (16)
Wax Myrtle/Bayberry (36)	Paspalum (19)	Rice Cutgrass (14)
Willow (25)	Panicgrass (67)	Wild Rice (23)
Oak (96)	Bristlegrass (77)	Wild Millet (29)
Elm (20)	Pigweed (55)	Chufa and allies (23)
Hackberry (48)	Pokeweed (28)	Bulrush (52)
Mulberry (38)	Chickweed (36)	Spikerush (29)
Osage-Orange (3)	Strawberry (31)	Sawgrass (14)
Saltbush (22)	Partridge-pea (4)	Duckweed (16)
Chokeberry (11)	Clover (40)	Pickerelweed (4)
Blackberry (97)	Beggels-ticks (4)	Smartweed (66)
Wild Rose (24)	Lespedezas (7)	Waterlily (17)
Wild Cherry (81)	Wood Sorrel (16)	Cow Lily (8)
Wild Plum (4)	Doveweed (21)	
Acacia (7)	Jewelweed (7)	
Black Locust (4)	Spurge (15)	
Sumac (50)	Violet (9)	
Holly (36)	Nightshade (45)	
Maple (33)	Ragweed (71)	
Grape (75)	Sunflower (60)	
Virginia Creeper (30)	Dandelion (33)	
Black Gum (33)		
Blueberry (53)		
Persimmon (19)		
Beautyberry (10)		
Buttonbush (11)		
Pantridge Berry (7)		
Viburnum (25)		

[a] Source: Martin et al. 1951

[b] Numbers in parentheses denote the relative number of bird and mammal species that have been recorded as using that plant species throughout its range.

Groundwater Levels

The ecological impacts resulting from groundwater mounding can be partially mitigated by controlling the timing and duration of the increases. If the duration of the increases is short (a few weeks), then effects on vegetation will not be permanent. The impacts on burrowing animals can be reduced if the groundwater level does not rise during periods of extremely hot and cold temperatures. The groundwater levels should also be controlled during the early spring growing seasons to avoid adversely affecting young plants. For citrus, the groundwater level should be controlled as much as possible and not be allowed to rise during very dry periods.

D.1.3 Mitigation of Air Resource Impacts

Odor

With regard to impacts on air resources, odor was determined to have the highest potential impact if proper treatment facility operation does not occur. Good housekeeping procedures should be followed at all times, and potential odor causing material, such as sludge, screenings, skimmings and grit should be properly handled. Such material should not be stored for excessive periods on-site prior to disposal. Careful attention should also be given to proper operation of the various chlorination systems to prevent odor problems from developing at the distribution center and disposal sites.

D.1.4 Mitigation of Land Resource and Land Use Impacts

Land Resources

Mitigative measures for impacts on land resources due to sinkhole formation are not available. However, if a sinkhole does develop, operation of the particular basin would cease and an alternate basin would be utilized.

Land Use

The increase in groundwater levels due to RIB operation could adversely affect production of citrus in the affected areas. As mentioned previously, monitoring of groundwater levels and careful operation of the RIBs should prevent an increase in groundwater levels which might be detrimental to existing vegetation. A reforestation program will be implemented in order to mitigate impacts on land uses adjacent to the RIB sites. Construction impacts on the egg production at a poultry farm adjacent to RIB Site 7 can be reduced by not parking construction equipment near the farm and avoiding bright lights and loud noises.

D.2 Measures Incorporated in the Final Plan

The 201 planning effort has been very responsive to EIS and public concerns during the development of the selected plan. Several measures designed to mitigate the potentially adverse impacts identified during the development of the selected plan were described in the previous subsection. A brief discussion of the selected measures is presented below.

Lake Levels

Resolutions enacted by the City and County require that remedial actions be implemented whenever lake levels in the RIB area reach 18" below their respective 100-year flood levels. Lake level monitoring will be performed on a quarterly basis initially and in conjunction with lake water quality monitoring. If lake levels do exceed acceptable limits, the application rates or scheduling of the RIBs involved will be adjusted accordingly. Affected RIBs may also be removed from service, if necessary.

Groundwater Levels

Groundwater monitoring will be conducted to record changes in groundwater levels and help prevent any potentially adverse impacts that might occur due to groundwater mounding. Excessive groundwater mounding could cause increased surface runoff rates, septic tank malfunctions and property flooding. Mitigative measures involve adjusting RIB application rates or utilizing alternate RIBs. A computerized management system called the "On-Going Management Tool" will be used in conjunction with disposal control systems to allow for operational modifications based on monitoring and flow control data.

Water Quality

Groundwater and surface water quality impacts will be continually assessed by instituting a monitoring program. The proposed quarterly sampling frequency is planned to be adjusted, as needed, based on the results of the initial sampling programs. This program was described previously, and therefore, will not be discussed further.

Odor

Potential odor problems from the operation of the wastewater treatment plants can be avoided by using proper housekeeping and operational techniques. Improvements to the McLeod Road and Sand Lake Road facilities should alleviate existing odors, rather than creating new odor sources.

Poultry Farm Production

Mitigative measures to prevent a decrease in egg production at a poultry farm adjacent to RIB Site 7 include avoiding loud noises and bright lights. This can be accomplished easily by not allowing parking of construction equipment near the farm.

Construction

Normal construction practice for the area will offset any adverse impacts caused during construction activities by immediate revegetation of the affected areas. By planting various types of foliage, wildlife activity in the area may increase from the level prior to construction.

Aesthetics

RIB sites have been carefully selected so as to have minimal environmental impact on the surrounding areas. Undeveloped areas have been chosen, and a program to landscape and reforest the portions of the site not planned for RIB construction will be implemented to improve the site aesthetics and provide a buffer from surrounding land uses. As was mentioned previously, design guidelines adopted by the Orange County Board of County Commissioners were incorporated into the RIB designs to ensure that the RIBs are located at least 100 feet from adjoining property lines, 500 feet from Dangler Road, and 500 feet east of the most western boundary of Site 6. If seepage from the sites should occur, modifications will be made to the effluent loading rates, as required by FDER.

Summary

The mitigative measures described above will effectively reduce or eliminate potential adverse impacts associated with the selected plan. The selected plan thus meets the requirements set forth by FDER and U.S. EPA by eliminating effluent discharge to Shingle Creek, while implementing in its place a cost-effective, environmentally sound wastewater treatment program.

Orange County and the City of Orlando have developed and signed resolutions with home owners associations and standardized citrus irrigation agreements in order to implement the proposed project. Commitment to various mitigative measures discussed above are incorporated in these resolutions. Appendix C contains resolutions by the County and City regarding design and operation of the RIBs and mitigation of lake and groundwater impacts. Appendix D contains a standard agreement between the City, County and citrus grove owners participating in the project.

E. ORANGE COUNTY EIS GRANT CONDITION

If operation of the rapid infiltration basin system is shown to cause unreasonable adverse impacts, such as property flooding or damage, crop flooding or damage, adverse water quality impacts to area lakes, significant impacts to the area's groundwater quality or adverse impacts from groundwater level rises, the following mitigative measures shall be considered and the most appropriate ones taken by the County or other operators of the grant funded facilities to correct the problem:

1. Reduction in loading to specific basin sites.
2. Relocation of specific basin sites.
3. Expansion of the acreage of the basin sites.
4. Additional basin sites.
5. Increase use of irrigation operation.
6. Increase level of treatment prior to infiltration.

These measures have been found appropriate by the Environmental Impact Statement to minimize potentially significant adverse impacts. The condition will be in effect throughout the life of the project.

CHAPTER FIVE

EIS COORDINATION

BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY

A. Introduction

The purpose of this chapter is to document the interactions and communications which occurred during the preparation of this 201 and EIS between local, state and federal agencies, their consultants, and affected members of the local community. Various methods were utilized in order to present the 201 and EIS findings and solicit comments from the groups involved. These methods included meetings, public hearings, newletters, news releases and the formation of a 201 Technical Advisory Committee and Citizen's Review Group for the EIS.

B. Coordination with Local, State and Federal Agencies and Organizations

Throughout the 201 and piggy-back EIS process, many agencies were involved directly or indirectly in the development and review of work products. The comments and/or concerns of these agencies have been incorporated into the Draft EIS. Table V-1 lists the agencies involved. Close coordination between all parties involved throughout the preparation of the 201 and EIS resulted in the development of a selected plan which is environmentally sound and acceptable to the general and affected public.

C. Public Participation Program

Public participation programs are mandated by federal regulations for the preparation of both 201 Facilities Plans and Environmental Impact Statement. A public participation program was implemented during the preparation of the Environmental Impact Statement for the Southwest Orange county 201 Facilities Plan. The purpose of the program is to provide an opportunity for public input and review throughout the preparation of the EIS. The program was a combined effort of EPA, Orange County and the EIS consultant.

A public meeting was held October 30, 1978 at the Windermere Elementary School in the Town of Windermere, Florida. The meeting had several purposes including informing the public about the 201 and piggy-back EIS, the further definition of the scope of the study and the solicitation of public input concerning the major study issues. Major issues raised at the meeting concerned the effects of providing centralized wastewater facilities in rural areas of the county and the need to conserve the water resources of the area.

The Southwest Orange County 201 Facilities planning effort included the participation of a Technical Advisory Committee (TAC). The TAC provided input regarding overall project policy decision making, coordination and technical review. The membership of the 201 TAC is provided in Table V-2.

TABLE V-1

AGENCY COORDINATION LIST

STATE OF FLORIDA

Florida Department of Environmental Regulation
Florida Game and Freshwater Fish Commission
Office of the Governor, Intergovernmental Coordination
State of Florida Department of Natural Resources
Florida Department of Administration, Division of State Planning
Department of State, Division of Archives, History and Records Management
Florida Department of Agriculture and Consumer Services, Division of Forestry
Florida Public Service Commission
Florida Department of Transportation
Florida Department of Commerce
Florida Department of Health and Rehabilitation Services

UNITED STATES GOVERNMENT

Environmental Protection Agency, Region IV
Environmental Protection Agency, Headquarters' AT Task Force
Department of Agriculture, Soil Conservation Service
Department of the Interior, Geological Survey
Army Corps of Engineers

LOCAL ENTITIES/AGENCIES

Orange County
City of Orlando
City of Edgewood
City of Belle Isle
City of Winter Park
City of Winter Garden
Town of Windermere
East Central Florida Regional Planning Council
South Florida Water Management District
Southwest Florida Water Management District

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TABLE V-2

201 TECHNICAL ADVISORY COMMITTEE

MEMBER	REPRESENTING
Mr. Gabe L. Delneky, P.E. Chief Engineer	Orange County Public Utilities, Orange County
Mr. Howard W. Jewett, P.E. Superintendent	Wastewater Department, City of Orlando
Honorable Mauro C. Rigante	City Council, City of Belle Isle
Mr. Harry Rodis Assistant Subdistrict Chief	U.S. Dept.of the Interior, Geological Survey - Orlando
Mr. Donald J. Babair	Town of Windermere
Mr. Richard F. Hoffman District Conservationist,S.C.S.	City of Orlando
Mr. Lee Miller	St. Johns River District, FDER Orlando
Mr. Vince Williams	Division of Fisheries, Game and Fresh Water Fish Commission - Kissimmee
Mr. David Peacock, Chief	Florida/M.S. Facility Planning Section, EPA, Region IV - Atlanta

As part of the EIS program, a Citizen's Review Group (CRG) was formed to provide an opportunity for public involvement in the 201/EIS process. Members of the CRG represented a cross-section of community interests and are listed in Table V-3. The CRG was the focal point of the public participation program. The objective of the CRG was to ensure that the views and comments of various interest groups and concerned individuals were considered during the evaluation of environmental impacts/concerns. The CRG provided citizens with an opportunity to assist in identifying impacts or concerns associated with the alternatives considered in the 201 process. All comments and suggestions by the CRG were given full consideration in the development of the EIS.

The initial meeting of CRG was held August 26, 1980 at 7:00 PM in the Orange County Courthouse, Orlando, Florida. Review of the EIS plan of study, public participation plans and status of the 201 planning effort was accomplished at this meeting. The purpose of the CRG and the role of EPA in the 201 and EIS process was also explained at the meeting. All subsequent CRG meetings were also held at the Orange County Courthouse.

The second meeting of the CRG was held April 30, 1981 at 7:00 PM. The purpose of the meeting was to review and discuss the Environmental Inventory Report. Other topics included the project status, review of major environmental issues, and a discussion of the future role of the CRG.

The next meeting of the CRG was held on September 14, 1981. Discussions at this meeting related to the alternatives under consideration. Members of the CRG were asked for their comments and concerns related to the alternatives being considered. Some of the issues and potential environmental impacts associated with the alternatives that had previously been identified were also described for the CRG members. A follow-up meeting was held on October 28, 1982 at 3:00 PM to discuss the EIS plan of study for the evaluation of effluent transmission/disposal alternatives.

The fifth meeting of the CRG was held on February 10, 1983. At this meeting, the 201 Plan alternatives were again reviewed, and the EIS impacts evaluation of the effluent disposal alternatives was summarized and discussed. A considerable number of comments were voiced by the CRG and focused on two major issues. These were the impacts on water resources and odor problems adjacent to disposal sites. The CRG members suggested that due to confusion about the 201 Plan there needed to be a more intensive public information program, especially in the area of the proposed disposal systems.

Four days after the fifth CRG meeting, a public hearing was held at the Orlando City Hall to review the 201 alternatives and approve the recommended alternative. Another public hearing was held on the following day at the Orange County Courthouse for the same purpose.

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TABLE V-3

SOUTHWEST ORANGE COUNTY 201 EIS CITIZENS REVIEW GROUP

MEMBER	REPRESENTING
Ms. Geraldine Aldridge	Private Citizen
Colonel William E. Nix	Private Citizen
William B. Boltin III	Private Citizen
Mr. John M. Nabors	Private Citizen
Mr. Corbin C. Ballentine	Private Citizen
Mr. Bob Davis	Private Citizen
Mr. John Cope	Private Citizen
Mr. Ellias N. Chotas	Private Citizen
Mrs. Kathy Wacker	Private Citizen
Mr. James M. Thomas	BioScape
Mr. Rick Amick	Private Citizen
Ms. Agnes Foote	Private Citizen
Mr. John Morrison	Private Citizen
Mr. Art Cole	Private Citizen
Mr. Roy Dye	Bel-Aire Homes
Mr. John Lowndes	Lowndes, Drosdick and Doster, P.A.
Ms. Carolyn Greer	Windermere Realty
Mr. Robert H. Elrod	Windermere Realty
Mr. Robert H. Freeman President	T.H. Freeman & Sons, Inc.
Mr. Ralph Sias	Private Citizen
Mr. Jon Ramer	Private Citizen

TABLE V-3

SOUTHWEST ORANGE COUNTY 201 EIS
CITIZENS REVIEW GROUP
(Continued)

MEMBER	REPRESENTING
Mr. Howard Mallen	Private Citizen
Mr. John Rinehart	Private Citizen
Mr. Henry Swanson	Private Citizen

A series of meetings with West Orange County residents in the Lake Avalon area was initiated on February 23, 1983 to discuss the project and the concerns of the residents. Continuing refinements to the project resulted and County/City resolutions adopted in response to these meetings and the continuing dialogue.

A public meeting was held on April 18, 1983 by the Florida Department of Environmental Regulation at the West Orange High School to ascertain the position and concerns of the citizens of the area regarding the recommended plan. The major concerns expressed at this meeting related to water resource impacts, odors from the disposal sites and impacts on property values.

Public hearings for the purpose of adopting the selected 201 Plan were held on July 16, 1984 at Orlando City Hall and the Orange County Courthouse. There was no public opposition to the selected plan voiced at either of the two hearings.

The last CRG meeting was held on September 27, 1984. The purpose of the meeting was to review the Environmental Impacts Evalution of the Selected Plan and measures which have or could be used to mitigate projected adverse impacts.

CHAPTER SIX

LIST OF PREPARES

PROJECT PERSONNEL

U.S. Environmental Protection Agency	
EIS Project Officer	Robert C. Cooper
Chief, NEPA Compliance Section	Robert B. Howard
Orange County, Florida	
EIS Project Manager	Harold Hill
Mayes, Sudderth & Etheredge, Inc.	
Project Managers	Paul Wagner Michael Cliburn
Air Resources	Paula McCullers Jim Nissen
Land Resources	Steve Shugart
Water Resources	Robert Fuller Steve Shugart Steve McCullers Robert Rutter Paul Wagner Karen Wieland
Population/Land Use	Ronald Manley Robert Rutter
Transportation/Energy Use	Jim Nissen
Water Resources Management	Robert Rutter
Community Services and Facilities/Taxes and Budgets	Ronald Manley Michael Cliburn
Science Applications, Inc.	
Ecological Resources	Richard Ambrose, Ph.D. Raymond McCord, Ph.D. Don Powers, Ph.D.
Archaeological Consultants, Inc.	
Archaelogical/Historical Resources	Marion Almy Joan Demming
Bionomics, Inc.	
Water Quality Sampling/Analysis	Richard Alt

APPENDIX A

PROJECTED POPULATION AND WASTEWATER FLOWS

TABLE A-1a*
SOUTHWEST 201 PLANNING AREA

RESIDENT POPULATION

TZ'S	PERCENT	1980	1985	1990	1995	2000
*117	.20	297	367	391	438	520
*119	.80	199	299	399	499	599
*120	.40	276	338	348	358	368
I-3		772	1,004	1,138	1,295	1,487
265		2,062	2,359	2,657	2,955	3,253
266		1,992	2,545	3,098	3,651	4,205
267		355	882	1,408	1,935	2,462
II-2		4,409	5,786	7,163	8,541	9,920
*475.1	.95	48	48	48	48	48
*475.2	.95	91	91	91	91	91
475.3		14	14	14	14	14
476.1		96	96	96	96	96
*476.2	.90	33	33	33	33	33
*478.1	.95	114	114	114	114	114
479.1		66	66	66	66	66
479.2		96	96	96	96	96
480		94	94	94	94	94
*483.1	.05	17	17	17	17	17
*484.1	.60	90	90	90	90	90
III-1		759	759	759	759	759
477.1		641	1,154	2,308	2,833	3,335
478.2		148	148	152	156	156
482.1		360	368	375	382	390
482.2		882	934	987	1,039	1,092
III-2		2,031	2,604	3,822	4,399	4,973

TABLE A-1a*
SOUTHWEST 201 PLANNING AREA

RESIDENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
288		174	174	174	174	174
*289	.85	26	90	235	300	365
290		233	636	771	1,039	1,510
291		343	796	947	1,249	1,778
292		2,783	3,008	3,513	3,738	3,963
293		627	985	1,790	2,148	2,506
294		718	816	915	1,013	1,112
359		447	1,753	2,530	3,605	5,138
360.2		139	312	371	486	688
482.3		447	528	556	611	706
III-3		5,937	9,098	11,802	14,363	17,940
360.1		1,660	2,870	3,273	4,079	5,491
393		1,242	3,040	3,595	4,838	6,936
411		849	1,592	1,841	2,335	3,203
478.3		1,248	2,533	2,569	3,818	5,317
III-4		4,999	10,035	11,278	15,070	20,947
392		321	425	525	600	650
394		000	000	000	000	000
395		81	155	178	220	245
397		1,968	2,015	2,055	2,076	2,100
408		368	368	368	368	368
409.1		10	10	10	10	10
409.2		7	7	7	7	7
410		7	7	7	7	7
III-5		2,762	2,987	3,150	3,288	3,387
412		2.406	6,463	8,492	9,304	9,304
472.1		203	332	347	372	418
472.2		54	54	58	58	58
473.1		2,553	5,067	6,324	6,827	6,827
473.2		1,116	3,334	4,443	4,887	4,887
473.3		80	85	85	89	89

TABLE A-la*
SOUTHWEST 201 PLANNING AREA
RESIDENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
477.2		1,168	1,569	1,703	1,970	2,438
477.3		89	177	207	265	369
III-6		7,759 (117)	17,081 (133)	21,659 (139)	23,772 (149)	24,390 (167)
*474.2	.15	62	62	62	62	62
III-7		62	62	62	62	62
296		3,710	3,777	3,928	3,995	4,063
298.1		2,364	2,613	3,175	3,424	3,674
298.2		2,741	2,885	3,212	3,356	3,501
299		145	238	448	542	635
300		1,817	1,966	2,305	2,455	2,605
301		541	555	570	585	600
302		3,036	3,277	3,419	3,610	3,802
303		268	464	661	857	1,053
354		3,332	3,484	3,636	3,789	3,941
355		1,844	1,910	1,977	2,043	2,109
356		3,069	3,241	3,415	3,587	3,760
357		4,873	4,879	4,886	4,892	4,899
358		6,390	6,596	6,665	6,803	7,044
IV-1		34,130	35,835	38,297	39,938	41,686
308		669	761	792	854	962
309.2		836	928	959	1,021	1,129
IV-2		1,505	1,689	1,751	1,875	2,091
310		2,898	2,948	2,966	3,000	3,060
311		1,984	2,034	2,052	2,086	2,146
352		1,276	1,486	1,532	1,660	1,884
353		2,359	2,701	2,815	3,044	3,443
IV-3		8,517	9,169	9,365	9,790	10,533

TABLE A-1a*
SOUTHWEST 201 PLANNING AREA
RESIDENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
361		3,080	3,812	4,569	5,336	6,110
362		573	1,100	1,277	1,628	2,244
363		3,902	4,261	4,625	4,987	5,349
364		000	000	000	000	000
390		6,685	7,600	8,516	9,431	10,346
391		3,053	3,627	3,819	4,203	4,873
396		1,670	1,761	1,852	1,943	2,034
398		819	857	896	935	973
IV-6		19,782	23,018	25,554	28,463	31,929
365		1,274	1,478	1,682	1,887	2,092
366		1,968	2,320	2,439	2,674	3,085
388		2,979	3,772	4,036	4,564	5,489
389.1		1,544	1,713	1,883	2,053	2,223
389.2		4,679	4,765	4,852	4,939	5,026
399		4,481	4,533	4,585	4,638	4,690
400		2,283	2,707	3,132	3,557	3,982
407.1		118	489	1,324	1,694	2,065
IV-7		19,326	21,777	23,934	26,006	28,652
*384	.20	582	595	608	621	635
*385	.75	863	1,099	1,179	1,337	1,614
386		3,030	3,228	3,426	3,624	3,822
387		1,721	1,822	1,923	2,024	2,125
401		1,367	1,563	1,760	1,956	2,152
402		1,071	1,106	1,142	1,177	1,212
IV-8		8,634	9,413	10,038	10,739	11,560
406		566	535	469	440	410
407.2		25	25	25	25	25
413		624	620	611	608	604
414		201	182	141	123	104
415		40	38	36	35	34
416		1,085	1,090	1,102	1,107	1,112

TABLE A-1a*
SOUTHWEST 201 PLANNING AREA
RESIDENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
471.1		9	9	9	9	9
*471.2	.30	8	8	8	8	8
IV-9		2,558	2,507	2,401	2,355	2,306
127		1,119	1,347	1,423	1,575	1,841
128		973	1,159	1,345	1,530	1,716
*129	.10	292	334	356	388	445
130		2,298	2,809	2,980	3,320	3,916
187		453	635	697	819	1,033
190		2,889	3,543	3,762	4,198	4,962
191		1,578	1,981	2,116	2,384	2,855
192		638	716	743	795	886
V-1		10,240	12,524	13,422	15,009	17,654
*131	.10	175	269	300	363	472
*185	.95	3,813	3,999	4,186	4,373	4,559
VI-2		3,988	4,268	4,486	4,736	5,031
188		1,054	1,204	1,254	1,354	1,529
189		1,196	1,376	1,437	1,558	1,769
201		985	1,387	1,790	2,193	2,595
202		4,494	4,889	5,285	5,681	6,076
203		3,727	3,893	4,060	4,226	4,392
204		2,385	2,731	2,847	3,078	3,482
205		462	909	1,917	2,365	2,813
251		92	92	92	92	92
252		119	119	119	119	119
253		718	953	1,228	1,384	1,541
254		34	34	34	34	34
255		4,204	4,672	5,141	5,610	6,078
256		531	523	534	536	538
257		3,011	3,555	4,099	4,642	5,186
258		2,593	2,661	2,731	2,800	2,869
259		1,766	1,857	1,948	2,039	2,130

TABLE A-1a*
SOUTHWEST 201 PLANNING AREA
RESIDENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
260		1,996	2,177	2,359	2,540	2,722
261		1,756	1,756	1,756	1,756	1,756
262		1,901	2,008	2,117	2,224	2,332
263		1,562	1,562	1,562	1,562	1,562
264		1,223	1,382	1,542	1,701	1,861
295		1,211	1,424	1,638	1,852	2,066
297		635	665	696	727	757
V-4		37,655	41,840	46,186	50,073	54,299
206		555	573	592	610	628
246		2,276	2,362	2,448	2,534	2,620
247		2,464	2,464	2,464	2,464	2,464
249		36	36	36	36	36
*250.1	.95	353	353	353	353	353
250.2		33	33	33	33	33
VI-5		5,717	5,821	5,926	6,030	6,134
TOTAL		181,542	217,277	241,563	266,563	295,740

*Indicates the traffic zones only partially within the 201 Planning Area.

TABLE A-1b*
SOUTHWEST 201 PLANNING AREA
TRANSIENT POPULATION

TZ'S	PERCENT	1980	1985	1990	1995	2000
*117	.20	4	4	4	4	4
*119	.80	16	16	16	16	16
*120	.40	000	000	000	000	000
I-3		20	20	20	20	20
265		0	0	0	0	0
266		0	0	0	0	0
267		12	12	12	12	12
II-2		12	12	12	12	12
*475.1	.95	000	000	000	000	000
*475.2	.95	000	000	000	000	000
475.3		000	000	000	000	000
476.1		000	000	000	000	000
*476.2	.90	000	000	000	000	000
*478.1	.95	000	000	000	000	000
479.1		000	000	000	000	000
479.2		000	000	000	000	000
480		000	000	000	000	000
*483.1	.05	000	000	000	000	000
*484.1	.60	000	000	000	000	000
III-1		000	000	000	000	000
477.1		000	000	000	000	000
478.2		000	000	000	000	000
482.1		000	000	000	000	000
482.2		000	000	000	000	000
III-2		000	000	000	000	000
288		000	000	000	000	000
*289	.85	000	000	000	000	000
290		000	000	000	000	000
291		30	30	30	30	30
292		000	000	000	000	000
293		18	18	18	18	18
294		000	000	000	000	000

TABLE A-1b*
SOUTHWEST 201 PLANNING AREA

TRANSIENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
359		000	000	000	000	000
360.2		000	000	000	000	000
482.3		000	000	000	000	000
III-3		48	48	48	48	48
360.1		000	000	000	000	000
393		1,431	1,630	1,630	1,854	1,854
411		000	398	1,689	1,689	1,689
478.3		143	143	143	143	143
III-4		1,574	2,171	3,462	3,686	3,686
392		4,533	4,633	4,633	4,973	4,973
394		5,062	5,360	6,062	6,062	6,062
395		000	000	000	000	000
397		000	000	000	000	000
408		785	785	984	984	984
409.1		000	000	000	000	000
409.2		000	000	000	000	000
410		2,103	2,972	3,842	4,711	5,581
III-5		12,483	13,750	15,521	16,730	17,600
412		000	288	632	632	632
*472.1		298	603	993	1,325	1,325
472.2		000	95	95	95	95
473.1		000	10,500	21,365	25,092	28,819
473.2		000	000	000	000	000
473.3		000	000	000	000	000
477.2		000	000	000	000	000
477.3		489	954	954	1,511	1,511
III-6		787	12,440	24,039	28,655	32,382
*474.2	.15	610	729	819	944	944
III-7		610	729	819	944	944

TABLE A-1b*
SOUTHWEST 201 PLANNING AREA
TRANSIENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
296		000	000	000	000	000
298.1		000	000	000	000	000
298.2		000	000	000	000	000
299		000	000	000	000	000
300		551	650	650	650	650
301		000	000	000	000	000
302		000	000	000	000	000
303		000	000	000	000	000
354		000	000	000	000	000
355		409	533	638	712	712
356		823	823	823	823	823
357		000	000	000	000	000
358		000	000	000	000	000
IV-1		1,783	2,006	2,111	2,185	2,185
308		000	000	000	000	000
309.2		107	107	107	107	107
IV-2		107	107	107	107	107
310		000	000	000	000	000
311		42	42	42	42	42
352		163	213	213	213	213
353		000	000	000	000	000
IV-3		205	255	255	255	255
361		000	000	000	000	000
362		399	399	537	608	608
363		376	455	455	455	455
364		000	000	000	000	000
390		95	95	179	314	316
391		000	000	000	000	000
396		000	000	000	000	000
398		934	1,133	1,133	1,328	1,328
IV-6		1,804	2,082	2,304	2,705	2,705

TABLE A-1b*
SOUTHWEST 201 PLANNING AREA

TRANSIENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
365		553	692	745	793	793
366		48	48	48	48	48
388		85	85	85	85	85
389.1		322	322	368	368	368
389.2		000	000	000	000	000
399		344	344	481	481	481
400		000	000	50	189	189
407.1		1,173	1,391	1,536	1,630	1,630
IV-7		2,525	2,882	3,313	3,594	3,594
*384	.20	000	000	000	000	000
*385	.75	000	000	000	000	000
386		24	24	24	24	24
387		000	000	000	000	000
401		1,443	1,443	1,642	1,642	1,642
402		000	000	000	000	000
IV-8		1,467	1,467	1,765	1,966	1,966
406		93	199	225	286	286
407.2		239	358	358	358	358
413		000	000	119	119	119
414		000	000	60	139	240
415		000	000	000	000	000
416		000	000	000	000	000
471.1		000	000	000	000	000
471.2	.30	000	000	000	000	000
IV-9		332	557	762	902	1,003
127		000	000	000	000	000
128		14	14	14	14	14
*129	.10	2	2	2	2	2
130		40	40	40	40	40
187		000	000	000	000	000
190		000	000	000	000	000

TABLE A-1b*
SOUTHWEST 201 PLANNING AREA
TRANSIENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
191		000	000	000	000	000
192		000	000	000	000	000
V-1		56	56	56	56	56
*131	.10	6	18	28	38	38
*185	.95	560	755	755	938	938
V-2		566	733	783	976	976
188		000	000	000	000	000
189		000	000	000	000	000
201		000	000	000	000	000
202		000	000	000	000	000
203		000	000	000	000	000
204		000	000	000	000	000
205		000	000	000	000	000
251		000	000	000	000	000
252		000	000	000	000	000
253		000	000	000	000	000
254		000	000	000	000	000
255		435	541	541	541	541
256		000	000	000	000	000
257		000	000	000	000	000
258		000	000	000	000	000
259		000	000	000	000	000
260		000	000	000	000	000
261		000	000	000	000	000
262		000	000	000	000	000
263		000	000	000	000	000
264		000	000	000	000	000
295		000	000	000	000	000
297		1,121	1,121	1,121	1,121	1,121
V-4		1,556	1,662	1,662	1,662	1,662

TABLE A-1b*
SOUTHWEST 201 PLANNING AREA
TRANSIENT POPULATION
(continued)

TZ'S	PERCENT	1980	1985	1990	1995	2000
206		000	000	000	000	000
246		10	10	10	10	10
247		000	000	000	000	000
249		000	000	000	000	000
250.1	.95	000	000	000	000	000
250.2		000	000	000	000	000
V-5		10	10	10	10	10
TOTAL		25,945	41,027	57,049	64,513	69,211

*Source: Southwest Orange County 201 Facility Planning Program; Phase I Report; Volume 2; June, 1981.

TABLE A-2a*

2000 PROJECTED ORANGE COUNTY WASTEWATER FLOWS
(gpd)

Traffic Zone	Average Daily Base Flow	Infiltration/ Inflow	Industrial Flow	Total Wastewater Flow
117	22523	2230	0	24753
120	7777	770	14300	22847
119	40400	4000	0	44400
127	63832	6320	61050	131202
129	15453	1530	0	16983
128	75043	7430	0	82473
130	222301	16180	0	238481
187	37471	3710	0	41181
131	50702	5059	0	55761
185	514696	204241	0	718937
188	20604	2040	0	22644
190	62822	6220	0	69042
191	272397	66022	0	338419
192	12524	1240	0	13764
189	13332	1320	0	14652
206	5151	510	22000	27661
205	40299	3990	110001	154290
204	135845	40162	0	176007
202	341380	83096	0	424476
201	121907	12070	0	133977
203	443592	146283	0	589875
265	310272	11250	0	321522
258	276639	92800	0	369439
257	350975	90189	0	441164
251	0	0	24200	24200
252	0	0	31130	31130
246	14544	1440	0	15984
247	0	0	0	0
249	0	0	9977	9977
250.1	0	0	0	0
250.2	0	0	0	0
253	62317	6170	0	68487
255	407636	117830	0	525466
259	215130	69798	0	284928
260	274922	82056	0	356978
256	707	70	0	777
261	177356	65751	0	243107

TABLE A-2a*

2000 PROJECTED ORANGE COUNTY WASTEWATER FLOWS
(gpd)

Traffic Zone	Average Daily Base Flow	Infiltration/ Inflow	Industrial Flow	Total Wastewater Flow
262	235532	75549	0	311081
263	94637	35061	0	129698
264	132512	28747	0	161259
266	424705	96723	0	521428
267	219069	19960	0	239029
289	34239	3390	0	37629
290	151298	12770	0	164068
292	147258	22166	0	169424
294	90597	22741	0	113338
295	110797	17595	18348	146740
297	8585	850	1100	10535
299	24745	2450	0	27195
300	8787	870	0	9657
301	3131	310	0	3441
298.1	63529	6290	0	69819
296	19897	1970	0	21867
293	166953	16530	0	183483
291	126856	12560	0	139416
358	9191	910	0	10101
359	246440	24400	0	270840
354	26462	2620	0	29082
352	11110	1100	0	12210
353	82113	8130	22000	112243
356	49591	4910	0	54501
355	3636	360	0	3996
365	119382	21583	0	140965
366	133118	17912	0	151030
363	449652	113802	0	563454
364	0	0	0	0
388	484295	25100	5500	514895
386	127462	7130	0	134592
389.1	254217	19166	0	273383
390	1036058	604411	0	1640469
362	230684	18380	11000	260064
361	39794	3940	74251	117985
391	442986	133907	0	576893
387	58176	4040	0	62216
385	75851	7510	0	83361

TABLE A-2a*

2000 PROJECTED ORANGE COUNTY WASTEWATER FLOWS
(gpd)

Traffic Zone	Average Daily Base Flow	Infiltration/ Inflow	Industrial Flow	Total Wastewater Flow
402	14241	1410	0	15651
401	273710	7490	0	281200
389.2	483992	33177	0	517169
400	405919	61613	0	467532
399	488537	123090	0	611627
398	197657	14637	0	212294
396	193112	70565	119681	383358
395	5454	540	27500	33494
397	159075	168990	0	328065
394	93122	142520	0	235642
393	833351	213120	0	1046471
360.1	343905	34050	0	377955
360.2	36966	3660	0	40626
478.3	540653	40090	0	580743
409.1	1010	100	55001	56111
409.2	707	70	24200	24977
408	66357	34836	0	101193
407.1	340269	23130	0	363399
407.2	9595	950	66001	76546
406	0	0	97901	97901
416	2727	270	30800	33797
413	7575	750	171052	179377
415	0	0	116051	116051
414	28886	10750	409204	448840
412	978690	74040	4202750	5255480
411	451369	37050	0	488419
477.1	145743	14430	0	160173
477.2	102616	10160	0	112776
477.3	101505	10050	0	111555
473.3	909	90	0	999
471.1	0	0	550	550
474.2	26967	2670	550	30187
472.1	148268	14680	0	162948
472.2	7979	790	0	8769
392	3434	340	0	3774
410	451672	27830	1384500	1864002
473.1	3018082	273290	0	3291372
473.2	380871	37710	0	418581
TOTAL	20898819	4036558	7110598	32045975

TABLE A-2b*

2000 PROJECTED CITY OF ORLANDO WASTEWATER FLOWS

(gpd)

Traffic Zone	P (2000)	ADBF (2000)(1) (GPD)	I/I (2000(2) (GPD)	Industrial Flows (GPD)				Q (2000) (GPD)
				I_E	$(I_E)_{Incr.}$	$I_u^{(3)}$	I_T	
187	371	21,201	17,358	0	0	0	0	36,559
188	871	49,774	48,964	0	0	0	0	98,738
189	1,362	77,833	75,898	0	0	0	0	153,731
190	3,473	198,467	181,678	0	0	0	0	380,145
204	2,089	119,378	104,720	0	0	0	0	224,098
205	2,334	133,378	73,086	467,000	0	143,320	610,320	816,764
206	188	10,743	6,145	100,000	0	28,719	128,719	145,607
246	1,523	87,033	62,143	0	0	0	0	149,176
247	2,192	125,264	92,746	0	0	0	0	218,010
249	9	514	296	0	0	13,197	13,197	14,007
250.1	176	10,058	5,792	0	0	0	0	15,850
250.2	22	1,257	309	0	0	0	0	1,566
251	46	2,629	1,514	210,000	75,000	31,558	316,558	320,701
253	385	22,001	12,277	0	0	0	0	34,278
254	34	1,943	477	0	0	0	0	2,420
255	2,473	141,322	106,543	0	0	0	0	247,865
257	1,711	97,776	54,938	0	0	0	0	152,714
293	302	17,258	10,901	0	0	0	0	28,159
296	1,787	102,120	88,021	0	0	0	0	190,141
297	496	28,344	24,551	0	0	1,300	1,307	54,202
298.1	2,277	130,121	99,872	0	0	0	0	229,993
298.2	3,501	200,067	163,324	0	0	0	0	363,391
299	317	18,115	8,606	0	0	0	0	26,721
300	2,813	160,751	52,732	0	0	0	0	213,453
301	282	16,115	4,433	0	0	0	0	20,548
302	3,802	217,268	66,360	0	0	0	0	283,628
303	1,053	60,175	28,097	0	0	0	0	88,272
308	962	54,974	18,473	0	0	0	0	73,447
309.2	1,215	69,432	22,024	0	0	0	0	91,456
310	3,060	174,866	45,699	0	0	0	0	220,565
311	2,180	124,578	33,347	0	0	0	0	157,925

(Revised February 1982)

TABLE A-2b*

2000 PROJECTED CITY OF ORLANDO WASTEWATER FLOWS
(gpd)

Traffic Zone	P (2000)	ADBF (2000)[1] (GPD)	I/I (2000[2] (GPD)	Industrial Flows (GPD)				Q (2000) (GPD)
				I_E	$(I_E)_{Incr.}$	I_u[3]	I_T	
352	1,704	97,376	33,027	0	0	0	0	130,403
353	860	49,145	16,668	0	0	31,773	31,773	97,586
354	2,246	128,349	37,412	117,000	0	0	117,000	282,761
355	2,491	142,350	117,561	317,000	0	0	317,000	576,911
356	1,280	73,147	61,269	0	0	0	0	134,416
357	4,899	279,957	249,281	0	0	0	0	529,238
358	6,057	346,132	297,613	0	0	0	0	643,745
359	2,466	140,921	80,724	0	0	0	0	221,645
360.1	658	37,602	24,376	0	0	0	0	61,978
360.2	27	1,543	937	0	0	0	0	2,480
361	5,315	303,730	218,318	0	0	65,769	65,769	587,817
391	487	27,830	21,194	0	0	0	0	49,024
392	4,258	243,327	204,582	0	0	0	0	447,909
394	3,928	1,263,000 (4)	650,000 (5)	0	0	0	0	1,913,000 (6)
395	164	9,372	6,163	0	0	39,852	39,852	55,387
396	122	6,972	5,781	0	0	172,748	172,748	185,501
397	525	30,002	26,110	61,000	0	0	61,000	117,112
Totals	80,793	5,655,510	4,562,340	1,272,000	75,000	528,243	1,875,243	11,093,093

[1] ADBF = P X 70 GPCD.

[2] I/I = P X 31 GPCD.

[3] I_u = greatest of .05 (ADBF + I/I + Total Known Industry)
0.25 (Total Known Industry)

[4] ADBF = Commercial Acreage x 5690 GPD/Acre.

[5] I/I = Commercial Acreage x 2930 GPD/Acre.

[6] Q = Commercial Acreage x 8600 GPD/Acre.

ABBREVIATIONS

ADBF	Average Daily Base Flow
I/I	Infiltration/Inflow
I_E	Existing Industrial Flow (1980)
$(I_E)_{incr.}$	Increased Industrial Flow over I_E 1980
I_u	Unplanned Industrial Flow
I_T	Total Industrial Flow
P	Equivalent Residential Population
Q	Total Projected Flow

*Source: Southwest Orange County 201 Facilities Plan, Draft Alternatives Analysis; October, 1982.

(Revised February 1982)

APPENDIX B

THREATENED AND ENDANGERED PLANTS AND ANIMALS

APPENDIX B

THREATENED AND ENDANGERED PLANTS AND ANIMALS

Species	Legal Status[1] GFWFC[2]	Legal Status[1] USFWS[3]
Amphibians and Reptiles		
Short-tailed snake (*Stilosoma extenuatum*)	T	
Gopher frog (*Rana areolata*)	SCC	
Gopher turtle (*Gopherus polyphemus*)	SCC	
Eastern indigo snake (*Drymarchon corais couperi*)	T	T
American alligator (*Alligator mississippiensis*)	SCC	T
Birds		
Wood stork (*Mycteria americana*)	E	E
Bald eagle (*Haliaeetus leucocephalus*)	T	E
Everglade kite (*Rostrhamus sociabilis plumbeus*)	E	E
Southeastern kestrel (*Falco sparverius paulus*)	T	
Peregrine falcon (*Falco peregrinus*)	E	E
Florida sandhill crane (*Grus canadensis pratensis*)	T	
Little blue heron (*Florida caerulea*)	SCC	
Snowy egret (*Egretta thula*)	SCC	
Louisiana heron (*Hydranassa tricolor*)	SCC	
Limpkin (*Aramus guarauna*)	SCC	
Least tern (*Sterna albifrons*)	T	
Ivory-billed woodpecker (*Campephilus principalis*)	E	E
Red-cockaded woodpecker (*Picoides borealis*)	T	E
Florida scrub jay (*Aphelocoma coerulescens coerulescens*)	T	
Bachman's warbler (*Vermivora bachmanii*)	E	E
Kirtland's warbler (*Dendroica kirtlandii*)	E	E

Species	Legal Status[1]	
	GFWFC[2]	USFWS[3]
Mammals		
Sherman's fox squirrel (*Sciurus niger shermani*)	SSC	
Florida mouse (*Peromyscus floridanus*)	T	
Florida black bear (*Ursus americanus floridanus*)--except in Baker and Columbia counties and Apalachicola National Forest	T	
Florida panther (*Felis concolor coryi*)	E	E
Plants		
Curtis milkweed (*Asclepias curtissii*)		

1. E=Endangered, T=Threatened, SSC=Species of Special Concern
2. Classification by the Florida Game and Freshwater Fish Commission
3. Classification by the U.S. Fish and Wildlife Service.
4. Classification by the Preservation of Native Flora of Florida Act.

Sources

Federal Status: Endangered and threatened species of the Southeastern United States, revised March 1984, U.S. Fish and Wildlife Service, Region 4, Atlanta, Georgia.

State Status: Endangered and potentially endangered Fauna and Flora in Florida, official lists, April 20, 1984, Florida Game and Freshwater Fish Commission.

APPENDIX C

RESOLUTIONS CONCERNING THE DESIGN AND OPERATION OF RAPID INFILTRATION BASINS

RESOLUTION NO. 83-SW-02 [illegible]

A RESOLUTION RECOGNIZING THE LAKE AVALON HOME AND PROPERTY
OWNERS ASSOCIATION: PLEDGING COOPERATION AND STAT!NG
INTENT TO BE SENSATIVE TO THE CONCERNS OF THE ASSOCIATION;
PROVIDING AN EFFECTIVE DATE.

PREMISES

1. Orange County and the City of Orlando have joined in the evaluation nd planning of a new concept for wastewater management, and this concept involves eclaimed water storage and disposal through rapid infiltration basins and reuse for itrus irrigation.

2. Certain property and home owners in the Lake Avalon area have xpressed concerns that the placement and design of rapid infiltration basins might ecome a nuisance by appearance or other impacts.

3. In the spirit of cooperation, these home and property owners have aken the initiative to form an Association as a means to better communicate their nterests and concerns regarding this concept and have offered their time and resources or this purpose.

ACCORDINGLY, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ORANGE OUNTY:

Section 1. The staff of Orange County is hereby directed to communicate ith and consider the interests and concerns of the Lake Avalon Home and Property Owners ssociation, so long as the Committee has an interest in this concept, and staff shall eep the Board of County Commissioners advised of their interests and concerns.

Section 2. The staff is likewise directed to design and implement the oncept in a way which is compatible with the residential and agricultural properties in he Lake Avalon area, utilizing at all times the soundest and most practical technology o ensure protection of public health and incorporating aesthetically appropriate design or all works proposed.

Section 3. This Resolution shall take effect upon adoption.

RESOLVED THIS 15th DAY OF February, 1983.

Lou Treadway

Lou Treadway, Chairman, Board of County
Commissioners

ATTEST:

Mary Jo Garrison

Deputy Clerk, Board of County
Commissioners

RESOLUTION NO. 83-SW-12

A RESOLUTION CONCERNING THE DESIGN AND OPERATION OF RAPID INFILTRATION BASINS ("R.I.B.s") IN SOUTHWEST ORANGE COUNTY; PROVIDING WATER QUALITY GUARANTIES AND DESIGN STANDARDS PERTAINING TO THE WATER CONSERV II PROJECT; PROVIDING LIMITS ON EFFLUENT DISPOSAL CAPACITY; PROVIDING A MONITORING PLAN; PROVIDING PROTECTION FROM ABNORMAL EVENTS; LISTING POSSIBLE FUTURE DISPOSAL ALTERNATIVES; ADOPTING DESIGN STANDARDS; PROVIDING GUARANTEES CONCERNING ON-SITE STORAGE FACILITIES; PROVIDING LIABILITY AGAINST IMPROPER DESIGN AND OPERATION; PROVIDING LIMITS ON CONDEMNATION; PROVIDING FOR A SINGLE MANAGEMENT UNIT; RECOGNIZING THE AVALON ASSOCIATION; PROVIDING AN EFFECTIVE DATE.

PREMISES

1. On February 15, 1983, the Board of County Commissioners of Orange County adopted Resolution No. 83-SW-04 selecting a preferred wastewater management alternative for "Southwest Orange County" regarding the Water Conserv II Project, which includes a combination of citrus irrigation and rapid infiltration basins, and assures that productive citrus groves or dwelling units located within "Southwest Orange County", as defined in Resolution No. 83-SW-05, will not be the subject of condemnation proceedings except as set forth therein.

2. The residents and other landholders of that community have expressed, through the Lake Avalon Home & Property Owners Association ("Avalon Association"), concerns about the implementation of the Water Conserv II Project and the need for assurances concerning the safety, health and welfare of the residents in the area, and the need to minimize potential adverse environmental impacts which may be caused by the Project.

3. The Growers' Executive Committee and the Avalon Association have requested and received assurance that the Rapid Infiltration Basins ("R.I.B.s") to be located within Southwest Orange County will be designed and operated in an environmentally and aesthetically acceptable manner.

4. The Avalon Association and property owners will rely upon representations made by the City of Orlando and Orange County as to the design and operation of the R.I.B.s for the Water Conserv II Project.

BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ORANGE COUNTY:

SECTION 1. WATER QUALITY GUARANTEES. The quality of effluent to be distributed to the R.I.B.s shall meet all applicable standards established by the Florida Department of Environmental Regulation ("FDER") contained in Fla. Admin. Code Ch. 17-6, and in no case shall be less stringent than the effluent disposal characteristics set forth in Exhibit "A" attached hereto. In no event shall the disposal of treated effluent cause a health or environmental hazard to the residents of Southwest Orange County, or damage to commercial foliage establishments or residential properties.

SECTION 2. EFFLUENT DISPOSAL CAPACITY. The Water Conserv II Project shall deliver to Southwest Orange County, as defined in Resolution No. 83-SW-85, no more than 50 million gallons per day, average annual basis ("50 MGD") of treated effluent for both citrus irrigation and R.I.B.s unless reasonable notice is first given to the Avalon Association. Any increased flow above 50 MGD for application in Southwest Orange County may be delivered only as requested by a landowner for beneficial use and storage in accord with delivery practices established by approved grower's agreements referenced in above described Resolutions heretofore adopted by the City of Orlando and Orange County.

SECTION 3. MONITORING PROGRAM. Regular testing as required by the approved FDER Fla. Admin. Code Chs. 17-6 and 17-19 monitoring plans shall be done under the auspices of the FDER, and the method, frequency, and results of the testing shall be available for public inspection at the local office of FDER or another location agreed upon to ascertain that the effluent does not violate the standards set forth in Section 1 hereof, or that the Project shall not cause health or environmental hazard to groundwater located within the described Southwest Orange County. If a violation of the above is detected, it shall be communicated to the Liaison Committee Chairman of the Avalon Association within 24 hours. In addition, a copy of the written FDER Report of such violation shall be mailed to the Chairman of the Liaison Committee of the Avalon Association.

SECTION 4. EFFLUENT DISPOSAL; ABNORMAL EVENTS. In the event (a) the effluent does not meet the standards defined in Section 1 hereof, or (b) standing water or "bog effects" in areas are demonstrated to be a result of the R.I.B.s, the effluent shall be disposed of in accordance with FDER provisions for abnormal events.

SECTION 5. LAKE LEVELS. If the Project causes an overload of the surficial aquifer which results in an increase in lake levels to a point eighteen inches (18") below the 100-year flood elevation, then the Southwest 201 Project shall begin transferring flows to RIBs located more remote from those lakes being impacted or may take such other actions, including those contemplated in Section 4 hereof, to prevent effluent from contributing to an exceedance of the 100-year flood elevation.

SECTION 6. ALTERNATIVE METHODS OF EFFLUENT DISPOSAL. The design of the pipeline system from the plants to the distribution center located in Southwest Orange County shall include provisions for utilization of rapid infiltration basins or other land application methods along the pipeline route. The County and the City will pursue the utilization of treated wastewater for the benefit of homeowners, agricultural interests and other potential users of irrigation, such as spray irrigation of highway rights-of-way.

SECTION 7. DESIGN STANDARDS. The size and location restrictions contained in Orange County Resolution No. 83-SW-05 dated April 11, 1983, and the design and construction of that portion of the Water Conserv II Project within Southwest Orange County shall be substantially in accordance with those provisions outlined in the attached Exhibit "B", S.W. 201 Design Standards, which are intended to preclude the project from becoming a public health, environmental hazard, or creating a loss to neighborhood property values.

SECTION 8. ON-SITE STORAGE FACILITIES. The City and the County shall comply with all FDER requirements regarding the suitability of on-site storage facilities within groves, farms or other non-public lands, in relation to leakage, overflow, direct penetration to the Floridan Aquifer, sink-hole development or other public health or environmental hazards.

SECTION 9. LIABILITY FOR IMPROPER DESIGN AND OPERATION. The City and the County agree to be responsible for all liability for damage to property or injury to persons within Southwest Orange County resulting from improper design or operation of the Water Conserv II Project by the City and the County. The City and the County hereby waive immunity for such above-described liability consistent with state statute. The prevailing party(ies) in any lawsuit filed to enforce this Section shall be entitled to reasonable attorneys' fees and court costs.

SECTION 10. LIMITS ON CONDEMNATION. The eminent domain or condemnation restriction contained in Orange County Resolution No. 83-SW-05 dated April 11, 1983, relating to dwellings and producing groves shall apply to property on which there are commercial improvements and substantial commercial activities are regularly conducted. No condemnation proceedings for R.I.B.s to be constructed in Southwest Orange County shall be instituted after December 31, 1986, in connection with the Water Conserv II Project.

SECTION 11. SINGLE MANAGEMENT UNIT. The City and the County agree to form a single management unit for the operation of the Water Conserv II Project which shall receive and address all grievances of the citizens of Southwest Orange County relating to the operation and maintenance of said Project. This single agency will serve as interface to the Liaison Committee of the Avalon Association and all other involved agencies of both Orange County and the City of Orlando in such manner that various other agencies need not deal directly with every concern and that the citizens need not first determine and then contact the particular agency with jurisdiction of a particular matter.

SECTION 12. RECOGNITION OF AVALON ASSOCIATION. The County and the City recognize the Avalon Association and its elected Liaison Committee as an appropriate entity of the concerned citizens of Southwest Orange County. The Board of Commissioners of Orange County and the Orlando City Council shall make available to said Liaison Committee all data pertaining to the Southwest 201 or Water Conserv II Projects, including and especially the Water Quality Monitoring results whenever called upon by that committee, in accordance with Chapter 119, Fla. Stat. The

Liaison Committee shall have the right to periodically review the basin design and provide comments to the County with regard to the incorporation of warranted design improvements in the Southwest 201 Basin Design Standards as set forth in Exhibit "B". Further, regular meetings shall be established, as needed, to be held in the Avalon Community, and shall include the Project Manager, representatives of the City of Orlando and Orange County, the Liaison Committee of the Avalon Association, and interested citizens, for the purposes of review of progress of construction and, if the parties determine that it is necessary, monitoring of performance after the Project is operational.

SECTION 11. EFFECTIVE DATE. This Resolution shall take effect upon adoption.

RESOLVED this 1st day of August, 1983.

ORANGE COUNTY, FLORIDA

By:
Chairman, Board of County
Commissioners

ATTEST: THOMAS H. LOCKER,
CLERK TO THE BOARD OF COUNTY
COMMISSIONERS

By: Mary Jo Garrison
Deputy Clerk

EXHIBIT A

RAPID INFILTRATION EFFLUENT DISPOSAL CHARACTERISTICS

Parameter	Maximum Concentrations Level (mg/l)[1]
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Fluoride	1.4-2.4
Endrin	0.004
Lindane	0.004
Methoxychlor	0.01
Toxaphene	0.005
2,4-D	0.10
2,4,5-TP	0.01
Coliforms	<20
Ra 226	5pCi/l
Ra 228	5pCi/l
Chlorides	250
Copper	1.0
pH	6.5-8.5
Manganese	0.05
Sodium	250
Sulfate	250
Total Dissolved Solids	500
Zinc	5
Biological Oxygen Demand	20
Total Suspended Solids	20
Phosphorus	10
Total Nitrogen	30

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(1) Unless Noted Otherwise.

EXHIBIT B

SW 201 PROJECT DESIGN STANDARDS

I. INTENT

To establish aesthetic and functional design guidelines for siting and construction of the Southwest 201 Water Conservation Project (SW 201 Project) in Southwest Orange County to ensure minimal impacts to the community and environment resulting from implementation of the project.

II. SITE REQUIREMENTS

A. Buffer Requirements

The wetted perimeter of the Rapid Infiltration Basins ("RIBs") shall not be located less than 100 feet of an adjoining property line; except for 500 foot buffers as shown on Attachment #1 hereto.

B. Basin Overflow Requirements

The RIBs shall be designed with sufficient freeboard above the normal wetting depth to allow for containment of excess precipitation. The RIB operating plan shall provide contingencies for management of excess flows above normal project quantities due to weather conditions.

C. Mosquito Control/RIB Sites

The SW 201 Project will be designed, constructed and operated in such a manner that no areas will encourage, support, or provide the opportunity for the breeding of mosquitoes. The regular use of pesticides is not considered a proper design control.

D. Flood Zone

The RIBS shall be designed and operated, and loading rates developed based on site specific computer modeling and operational monitoring in order to ensure that RIB impacts are less than the 100-year flood plain elevation.

Basin Configuration

All RIBs shall be designed in a naturalistic manner. Layouts shall follow existing land contours with the intent of creating RIBs of irregular shapes and edge patterns. The basin berms and landscaping shall be designed to create amorphous basin edges.

F. Noise

Any and all permanent functions or installation appurtenant to the Project (excluding construction equipment or other devices not normally in operation for more than thirty (30) days at one time) shall produce no continuous sound which exceeds 63 dBA at the property line of the site on which it is located. Any other facilities which generate noise shall be designed to reduce noise production, as practical.

G. Odors

The SW 201 Project shall be so operated as to prevent the emission of objectional or offensive odors in such concentration as to be readily perceptible at any point at or beyond the property line of the project.

III. LANDSCAPE REQUIREMENTS FOR RAPID INFILTRATION BASINS AND DISTRIBUTION CENTER

A. Plant Material

Canopy trees and shrubs for buffering shall equal the standards for Florida No. 1 as given in "Grades and Standards for Nursery Plants" Part 1, 1963, and Part II, State of Florida Department of Agriculture. The perimeters of all sites and areas where there is high visibility from off-site areas shall have a combination of trees and shrubs installed such that within 2 years after installation it shall have reached a height of 3' and obtained opacity. There shall be a minimum average of three (3) trees planted per sixty (60) linear feet of perimeter area no less than 3 inches in caliper. Nothing herein shall require the removal or "clear cutting" of existing trees and vegetation, where such existing trees and vegetation are consistent with these Design Standards.

B. Grading

No berm or ground plane shall have a slope greater than 4:1 except as noted below, unless naturally occurring or necessary due to confining site constraints. Areas adjacent to public rights-of-way or existing or proposed residential areas shall have landscaped earthen berms (with maximum slope of 6:1) no less than 5 feet higher than the elevation at the adjoining property lines. Berm centerlines shall form a gentle meander; repeating or emphasizing naturally occurring landforms where appropriate.

C. Fencing

Any security fencing shall occur behind the landscape screens and buffer areas.

D. Landscape Cover

Areas not utilized for basins, parking, roads or built structures shall have a coverage of plant material including trees and grass as described in the Conserv II RIB's Reforestation Plan. The Reforestation Plan shall be designed and implemented to maximize the benefits of a diversified ecologically balanced reforestation. In order to insure a successful reforestation, the 201 project shall contract an ecological consultant experienced in the flora and fauna of the Avalon area. The selection of the consultant shall be subject to the review of the Avalon Association.

E. Acceptable Plant Materials

Plant material used shall generally be indigenous to Central Florida and in particular the Avalon area of West Orange County.

F. Maintenance

All landscaped areas shall be on a regular maintenance schedule to ensure a healthy vigorous project.

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G. Irrigation

All planted areas throughout the project shall be provided with necessary irrigation systems, fully functional at all times.

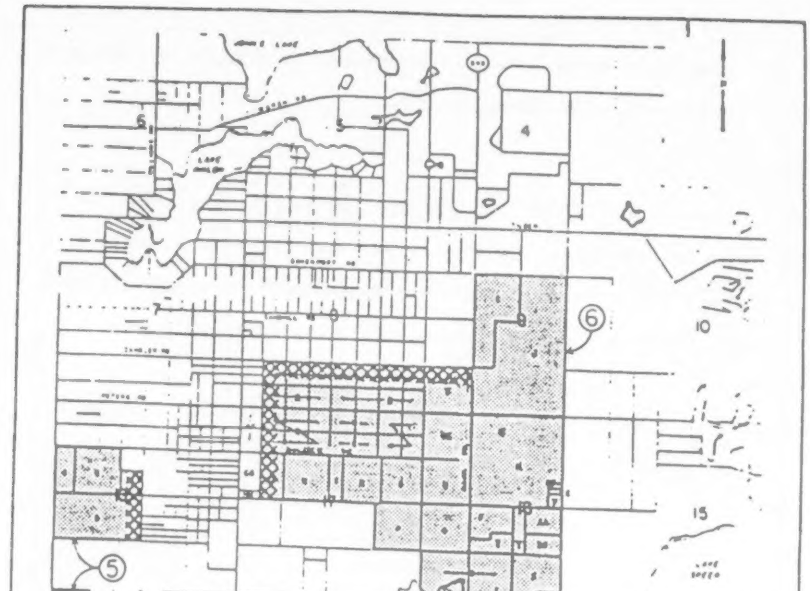
H. Timing

The Landscape Program and Reforesting Plan shall be completed as an integral component of the SW 201 Project construction program.

IV. REVIEW

All portions of the SW 201 Project covered by the above SW 201 Design Standards shall be submitted to the Liaison Committee of the Avalon Home and Property Owners Association and the Growers Executive Committee for review prior to completion of final construction design. The Avalon Committee will provide written comments to the County within one week of receipt of the design drawings. The County and/or City shall respond in writing to written comments within one week of receipt of comments.

The same process shall occur at the completion of construction documentation and prior to submission for any permits. The Liaison Committee or the Growers Executive Committee have the right to request intermediate reviews as they deem necessary to insure timely opportunities to provide community input.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LEGEND
500' BUFFER
OUT

Attachment No. 1

RESOLUTION CONCERNING THE DESIGN AND OPERATION OF RAPID INFILTRATION BASINS ("R.I.B.s") IN SOUTHWEST ORANGE COUNTY; PROVIDING WATER QUALITY GUARANTEES AND DESIGN STANDARDS PERTAINING TO THE WATER CONSERV II PROJECT; PROVIDING LIMITS ON EFFLUENT DISPOSAL CAPACITY; PROVIDING A MONITORING PLAN; PROVIDING PROTECTION FROM ABNORMAL EVENTS; LISTING POSSIBLE FUTURE DISPOSAL ALTERNATIVES; ADOPTING DESIGN STANDARDS; PROVIDING GUARANTEES CONCERNING ON-SITE STORAGE FACILITIES; PROVIDING LIABILITY AGAINST IMPROPER DESIGN AND OPERATION; PROVIDING LIMITS ON CONDEMNATION; PROVIDING FOR A SINGLE MANAGEMENT UNIT; RECOGNIZING THE AVALON ASSOCIATION; PROVIDING AN EFFECTIVE DATE.

PREMISES

1. On February 14, 1983, the City Council of the City of Orlando adopted a Resolution (Documentary #14056) selecting a preferred wastewater management alternative for "Southwest Orange County" regarding the Water Conserv II Project, which includes a combination of citrus irrigation and rapid infiltration basis, and assures that productive citrus groves or dwelling units located within "Southwest Orange County", as defined in the City's Resolution dated April 11, 1983 (MB65, Page 73, Item 16-M; Documentary #17700), will not be the subject of condemnation proceedings except as set forth therein.

2. The residents and other landholders of that community have expressed, through the Lake Avalon Home and Property

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Owners Association (Avalon Association), concerns about the implementation of the Water Conserv II Project and the need for assurances concerning the safety, health and welfare of the residents in the area, and the need to minimize potential adverse environmental impacts which may be caused by the Project.

3. The Growers' Executive Committee and the Avalon Association have requested and received assurance that the Rapid Infiltration Basins ("R.I.B.s") to be located within Southwest Orange County will be designed and operated in an environmentally and aesthetically acceptable manner.

4. The Avalon Association and property owners will rely upon representations made by the City of Orlando and Orange County as to the design and operation of the R.I.B.s for the Water Conserv II Project.

NOW THEREFORE BE IT RESOLVED by the City Council of the City of Orlando, Florida, as follows:

SECTION 1. WATER QUALITY GUARANTEES. The quality of effluent to be distributed to the R.I.B.s shall meet all applicable standards established by the Florida Department of Environmental Regulation ("FDER") contained in Fla. Admin. Code Ch.17-6, and in no case shall be less stringent than the effluent disposal characteristics set forth in Exhibit "A" attached hereto. In no event shall the disposal of treated effluent cause a health or environmental hazard to the residents of Southwest Orange County, or damage to commercial foliage establishments or residential properties.

SECTION 2. EFFLUENT DISPOSAL CAPACITY. The Water Conserv II Project shall deliver to Southwest Orange County, as defined in the City's Resolution (Documentary #14056), no more than 50 million gallons per day, average annual basis ("50 MGD") of treated effluent for both citrus irrigation and R.I.B.s unless reasonable notice is first given to the Avalon Association. Any increased flow above 50 MGD for application in Southwest Orange County may be delivered only as requested by a landowner for beneficial use and storage in accord with delivery practices established by approved grower's agreements referenced in above described Resolutions heretofore adopted by the City of Orlando and Orange County.

SECTION 3. MONITORING PROGRAM. Regular testing as required by the approved FDER Fla. Admin. Code Chs.17-6 and 17-19 monitoring plans shall be done under the auspices of the FDER, and the method, frequency, and results of the testing shall be available for public inspection at the local office of FDER or another location agreed upon to ascertain that the effluent does not violate the standards set forth in Section 1 hereof, or that the Project shall not cause health or environmental hazard to groundwater located within the described Southwest Orange County. If a violation of the above is detected, it shall be communicated to the Liaison Committee Chairman of the Avalon Association within 24 hours. In addition, a copy of the written FDER Report of such violation shall be mailed to the Chairman of the Liaison Committee of the Avalon Association.

SECTION 4. EFFLUENT DISPOSAL; ABNORMAL EVENTS. In the event (a) the effluent does not meet the standards defined in Section 1 hereof, or (b) standing water or "bog effects" in areas are demonstrated to be a result of the R.I.B.s, the effluent shall be disposed of in accordance with FDER provisions for abnormal events.

SECTION 5. LAKE LEVELS. If the Project causes an overload of the surficial aquifer which results in an increase in lake levels to a point eighteen inches (18") below the 100-year flood elevation, then the Southwest 201 Project shall begin transferring flows to R.I.B.s located more remote from those lakes being impacted or may take such other actions, including those contemplated in Section 4 hereof, to prevent effluent from contributing to an exceedance of the 100-year flood elevation.

SECTION 6. ALTERNATIVE METHODS OF EFFLUENT DISPOSAL. The design of the pipeline system from the plants to the distribution center located in Southwest Orange County shall include provisions for utilization of rapid infiltration basins or other land application methods along the pipeline route. The County and the City will pursue the utilization of treated wastewater for the benefit of homeowners, agricultural interests and other potential users of irrigation, such as spray irrigation of highway rights-of-way.

SECTION 7. DESIGN STANDARDS. The size and location restrictions contained in the City of Orlando Resolution dated April 11, 1983 (MB65, Page 73, Item 16-M; Documentary #17700), and the design and construction of that portion of the Water Conserv II Project within Southwest Orange County shall be substantially in accordance with those provisions outlined in the attached Exhibit "B", S.W. 201 Design Standards, which are intended to preclude the Project from becoming a public health, environmental hazard, or creating a loss to neighborhood property values.

SECTION 8. ON-SITE STORAGE FACILITIES. The City and the County shall comply with all FDER requirements regarding the suitability of on-site storage facilities within groves, farms or other non-public lands, in relation to leakage, overflow, direct penetration to the Floridan Aquifer, sink-hole development or other public health or environmental hazards.

SECTION 9. LIABILITY FOR IMPROPER DESIGN AND OPERATION. The City and the County agree to be responsible for all liability for damage to property or injury to persons within Southwest Orange County resulting from improper design or operation of the Water Conserv II Project by the City and the County. The City and the County hereby waive immunity for such above-described liability consistent with state statute. The prevailing party(ies) in any lawsuit filed to enforce this Section shall be entitled to reasonable attorneys' fees and court costs.

SECTION 10. LIMITS ON CONDEMNATION. The eminent domain or condemnation restriction contained in said City of Orlando Resolution dated April 11, 1983, relating to dwellings and producing groves shall apply to property on which there are commercial improvements and substantial commercial activities are regularly conducted. No condemnation proceedings for R.I.B.s to be constructed in Southwest Orange County shall be instituted after December 31, 1986, in connection with the Water Conserv II Project.

SECTION 11. SINGLE MANAGEMENT UNIT. The City and the County agree to form a single management unit for the operation of the Water Conserv II Project which shall receive and address all grievances of the citizens of Southwest Orange County relating to the operation and maintenance of said Project. This single agency wil serve as interface to the Liaison Committee of the Avalon Association and all other involved agencies of both Orange County and the City of Orlando in such manner that various other agencies need not deal directly with every concern and that the citizens need not first determine and then contact the particular agency with jurisdiction of a particular matter.

SECTION 12. RECOGNITION OF AVALON ASSOCIATION. The County and the City recognize the Avalon Association and its elected Liaison Committee as an appropriate entity of the concerned citizens of Southwest Orange County. The Board of Commissioners of Orange County and the Orlando City Council shall make available to said Liaison Committee all data pertaining to the Southwest 201 or Water Conserv II Projects, including and especially the Water Quality Monitoring results whenever called upon by that committee, in accordance with Chapter 119, Fla. Stat. The Liaison Committee shall have the right to periodically review the basin design and provide comments to the County with regard to the incorporation of warranted design improvements in the Southwest 201 Basin Design Standards as set forth in Exhibit "B". Further, regular meetings shall be established, as needed, to be held in the Avalon Community, and shall include the Project Manager, representatives of the City of Orlando and Orange County, the Liaison Committee of the Avalon Association, and interested citizens, for the purposes of review of progress of construction and, if the parties determine that it is necessary, monitoring of performance after the Project is operational.

SECTON 13. EFFECTIVE DATE. This Resolution shall take effect upon adoption.

ADOPTED at a regular meeting of the City Council of the City of Orlando, Florida, this 15th day of August, 1983.

Nap Ford
Mayor Pro tem

ATTEST:
Grace A. Chewning
Grace A. Chewning, City Clerk

APPROVED as to form and legality, AUGUST 11, 1983.

Richard D. Oldham III
ASST. City Attorney
City of Orlando, Florida.

EXHIBIT A

RAPID INFILTRATION EFFLUENT DISPOSAL CHARACTERISTICS

Parameter	Maximum Concentrations Level (mg/l)(1)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Fluoride	1.4-2.4
Endrin	0.004
Lindane	0.004
Methoxychlor	0.01
Toxaphene	0.005
2,4-D	0.10
2,4,5-TP	0.01
Coliforms	<20
Ra 226	5pCi/l
Ra 228	5pCi/l
Chlorides	250
Copper	1.0
pH	6.5-8.5
Manganese	0.05
Sodium	250
Sulfate	250
Total Dissolved Solids	500
Zinc	5
Biological Oxygen Demand	20
Total Suspended Solids	20
Phosphorus	10
Total Nitrogen	30

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(1) Unless Noted Otherwise.

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SW 201 PROJECT DESIGN STANDARDS

I. INTENT

To establish aesthetic and functional design guidelines for siting and construction of the Southwest 201 Water Conservation Project (SW 201 Project) in Southwest Orange County to ensure minimal impacts to the community and environment resulting from implementation of the project.

II. SITE REQUIREMENTS

A. Buffer Requirements

The wetted perimeter of the Rapid Infiltration Basins ("RIBs") shall not be located less than 100 feet of an adjoining property line; except for 500 foot buffers as shown on Attachment #1 hereto.

B. Basin Overflow Requirements

The RIBs shall be designed with sufficient freeboard above the normal wetting depth to allow for containment of excess precipitation. The RIB operating plan shall provide contingencies for management of excess flows above normal project quantities due to weather conditions.

C. Mosquito Control/RIB Sites

The SW 201 Project will be designed, constructed and operated in such a manner that no areas will encourage, support, or provide the opportunity for the breeding of mosquitoes. The regular use of pesticides is not considered a proper design control.

D. Flood Zone

The RIBS shall be designed and operated, and loading rates developed based on site specific computer modeling and operational monitoring in order to ensure that RIB impacts are less than the 100-year flood plain elevation.

All RIBs shall be designed in a naturalistic manner. Layouts shall follow existing land contours with the intent of creating RIBs of irregular shapes and edge patterns. The basin berms and landscaping shall be designed to create amorphous basin edges.

F. **Noise**

Any and all permanent functions or installation appurtenant to the Project (excluding construction equipment or other devices not normally in operation for more than thirty (30) days at one time) shall produce no continuous sound which exceeds 63 dBA at the property line of the site on which it is located. Any other facilities which generate noise shall be designed to reduce noise production, as practical.

G. **Odors**

The SW 201 Project shall be so operated as to prevent the emission of objectional or offensive odors in such concentration as to be readily perceptible at any point at or beyond the property line of the project.

III. LANDSCAPE REQUIREMENTS FOR RAPID INFILTRATION BASINS AND DISTRIBUTION CENTER

A. **Plant Material**

Canopy trees and shrubs for buffering shall equal the standards for Florida No. 1 as given in "Grades and Standards for Nursery Plants" Part 1, 1963, and Part II, State of Florida Department of Agriculture. The perimeters of all sites and areas where there is high visibility from off-site areas shall have a combination of trees and shrubs installed such that within 2 years after installation it shall have reached a height of 3' and obtained opacity. There shall be a minimum average of three (3) trees planted per sixty (60) linear feet of perimeter area no less than 3 inches in caliper. Nothing herein shall require the removal or "clear cutting of existing trees and vegetation, [illegible] existing trees and vegetation are consistent with these Design Standards.

B. Grading

No berm or ground plane shall have a slope greater than 4:1 except as noted below, unless naturally occurring or necessary due to confining site constraints. Areas adjacent to public rights-of-way or existing or proposed residential areas shall have landscaped earthen berms (with maximum slope of 6:1) no less than 5 feet higher than the elevation at the adjoining property lines. Berm centerlines shall form a gentle meander; repeating or emphasizing naturally occurring landforms where appropriate.

C. Fencing

Any security fencing shall occur behind the landscape screens and buffer areas.

D. Landscape Cover

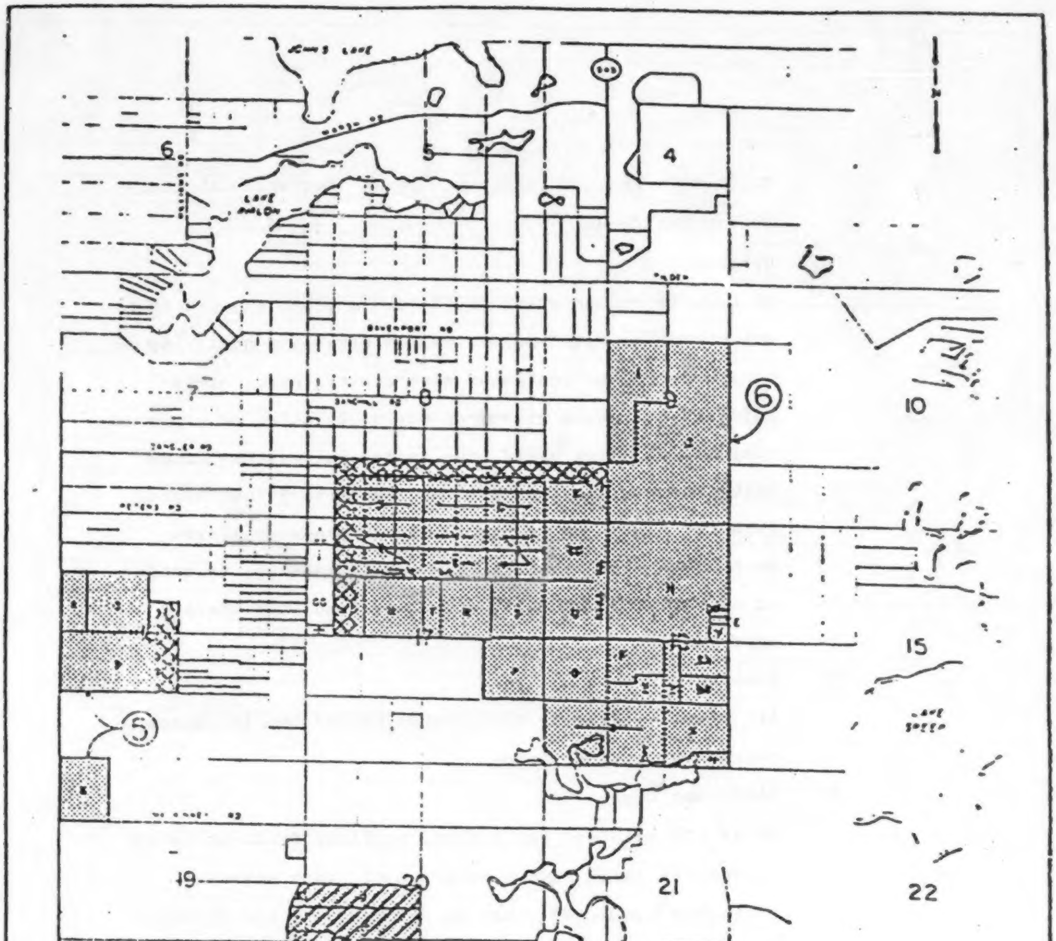
Areas not utilized for basins, parking, roads or built structures shall have a coverage of plant material including trees and grass as described in the Conserv II RIB's Reforestation Plan. The Reforestation Plan shall be designed and implemented to maximize the benefits of a diversified ecologically balanced reforestation. In order to insure a successful reforestation, the 201 project shall contract an ecological consultant experienced in the flora and fauna of the Avalon area. The selection of the consultant shall be subject to the review of the Avalon Association.

E. Acceptable Plant Materials

Plant material used shall generally be indigenous to Central Florida and in particular the Avalon area of West Orange County.

F. Maintenance

All landscaped areas shall be on a regular maintenance schedule to ensure a healthy vigorous project.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Attachment No. 1

APPENDIX D

STANDARD CITRUS IRRIGATION AGREEMENT

AGREEMENT FOR THE DELIVERY AND USE OF RECLAIMED IRRIGATION WATER

THIS AGREEMENT is made and entered into on __________ ______________, between the CITY OF ORLANDO ("City) , a municipal organization organized and existing under the laws of the State of Florida, and ORANGE COUNTY ("County"), a political subdivision of the State of Florida, hereafter collectively referred to as the "Suppliers" and ______________________________ ________________whose address or principal place of business is ____, hereafter referred to as the "Owner."

BASIS FOR THE AGREEMENT.

The Suppliers operate and maintain two publicly owned treatment works known as the Sand Lake Road and McLeod Road Treatment Plants which will be capable of producing reclaimed water which may be used for productive and beneficial purposes to irrigate citrus groves, pasture land, as well as urban and residential lawns. The governing council and commission of both Suppliers have approved this Agreement by appropriate resolutions and have authorized its execution by the undersigned representatives.

The Owner now owns approximately _______ acres of land which is described in Exhibit "A," attached and made a part hereof by reference. The Owner warrants that it owns title to this land in fee simple without liens or encumbrances, or if the land is encumbered that all holders of rights by lien or encumbrance have joined in this agreement as evidenced by an attached consent form with the intent to be bound to the extent of their interest. It is further warranted, if the Owner is corporate, that appropriate resolutions have authorized the undersigned representative to execute it so as to bind the Owner. The Owner shall not request more reclaimed water than can be beneficially used for irrigation, frost protection and surface storage purposes.

Both parties understand that the Suppliers will rely upon this Agreement in the design, construction and operation of the treatment, transmission and distribution systems for delivery of reclaimed water to the Owner. It is also understood that state and federal Funds will be sought by the Suppliers for the design and construction of the systems also in reliance upon the

EXHIBIT "C"

commitment of the Owner to use reclaimed water requested by the Owner for the term of this Agreement.

TERMS AND CONDITIONS.

In consideration of the commitment of the Suppliers to deliver reclaimed water at no cost to the Owner and the commitment of the Owner to receive and beneficially use this water for the purposes set forth in this Agreement, the parties agree to the following terms and conditions:

1. TERM OF THE AGREEMENT; RECORDING.

(a) The Suppliers shall deliver and the Owner shall accept and use reclaimed water produced by the Suppliers at the McLeod Road and Sand Lake Road Treatment Plants, or other equivalent facilities, and this Agreement shall be effective on the date of execution and for a term of twenty (20) years from ________________, 19____. It is anticipated, but not warranted, that delivery of water will commence in the calendar year of 1984. The term of this agreement shall be renewed automatically from year to year beyond the initial twenty-year term unless terminated by the Owner by written notice not less than 180 days in advance or by the Suppliers by written notice not less than 150 days in advance of the anniversary of the commencement of each annual renewal.

(b) Upon execution by both parties, this Agreement shall be binding as a covenant or condition, which shall run with the land described on Exhibit "A," upon any subsequent Owner unless the commitments undertaken by the Owner are modified as provided herein. A short form of this Agreement incorporating its terms and conditions by reference shall be recorded in the Official Records of each county in which the land is located.

2. USE OF RECLAIMED WATER; OWNER'S IRRIGATION SYSTEM.

(a) The Owner shall use reclaimed water delivered by the Suppliers for agricultural or urban irrigation, frost protection, surface storage or other purposes in any manner determined by the Owner except that use of the reclaimed water shall be consistent with state and federal regulations and shall not be applied directly to fruit or vegetables which are packed and shipped for fresh, unprocessed consumption. Reclaimed water may be applied in an under-tree method for fruit crops to be delivered as fresh fruit in a manner which protects against direct irrigation upon the fruit. In no event will the Owner discharge reclaimed water directly to surface waters of the State of Florida without written authorization from the Florida Department of Environmental Regulation ("FDER"). The Owner may apply reclaimed water in a manner authorized by the FDER on alternate application sites not planted in groves. No separate permits from the FDER will be required, but any alternate application sites must be identified and approval obtained by the Suppliers prior to utilization of reclaimed water at these sites. The Owner will also take all reasonable precautions, including signs and labeling, to prevent confusion between reclaimed water sources and other water sources.

(b) The Owner agrees to install or modify irrigation systems on the land described in Exhibit "A" to the extent necessary, sufficiently in advance so that reclaimed water will be received and used within thirty (30) days of receipt of written notice from the Suppliers that deliveries will commence. The Owner shall modify or install an irrigation system which will prevent a back flow of water from the Owner's irrigation system into the Supplier's distribution system. Also, the Owner shall provide, in a manner approved by appropriate regulatory agencies, a back flow prevention device between his irrigation system and any well which is maintained so that reclaimed water will not be discharged directly into groundwaters of the State. The Owner shall be solely responsible for the ownership, operation, and maintenance of all portions of the irrigation system located within the boundaries of Owner's property.

3. WATER QUALITY: PROTECTING AGRICULTURAL PRODUCTIVITY

(a) All reclaimed water delivered under this Agreement shall be treated by advanced treatment methods to remove harmful levels of bacteria, viruses and any other constituent which would constitute a danger to human health and in accord with all requirements of permits issued by state and federal regulatory agencies with jurisdiction over such activities. Likewise, reclaimed water shall be of a quality which is appropriate for irrigation of citrus or other approved food or fiber crops. Those constituents for which appropriate concentration limits have been identified are set forth in Exhibit "B" together with weekly, monthly, quarterly or other limits, as established by the Faculty of the IFAS Citrus Experiment Station, Lake Alfred, Florida, or such other independent horticultural scientists as may hereafter be mutually agreed to by the parties of this Agreement, (hereafter "horticultural scientists"). From time to time during the term of this agreement, other constituents may be identified and concentration limits established or modified for inclusion in Exhibit "B" in the same manner as those originally set forth. The Suppliers shall take all steps necessary to limit the concentration of constituents set forth in Exhibit "B" and to otherwise provide reclaimed water of appropriate quality including treatment, implementation of industrial or commercial pretreatment requirements or other remedial action. Finally, reclaimed water delivered under this Agreement shall contain as much of the beneficial nutrients and minerals found in the influent stream of each treatment plant as is economically feasible, acceptable to regulatory agencies, and in accord with sound engineering practice.

(b) The Suppliers agree to fund or obtain funds in the amount of One hundred twenty eight thousand dollars ($128,000) for an initial five (5) year study by qualified independent horticultural scientists of the effects of reclaimed water on Central Florida citrus groves, and will use their best efforts to obtain state, federal or private grants for the purpose of funding a second study of the long term effects of reclaimed water on Central Florida citrus groves.

(c) The Suppliers shall analyze the reclaimed water in accord with a monitoring plan which is attached to this Agreement as Exhibit "B." This plan shall set forth the constituents for analysis, the frequency of analysis, averages for determining constituent concentrations and all other factors governing monitoring for water quality. After completion, all analyses performed by Suppliers shall be forwarded promptly to the horticultural scientists charged with monitoring the effects of reclaimed water on citrus groves.

(d) The Suppliers will also analyze reclaimed water from the McLeod Road and Sand Lake Road Treatment Plants at least monthly for all constituents identified in Exhibit "B" during the six months prior to the date projected for the first delivery of reclaimed water to the Owner and shall furnish these analyses to the horticultural scientists so that baseline data may be established.

(e) If the horticultural scientists determine that concentrations of constituents are present in the reclaimed water which can be expected to reduce productivity of the Owner's grove or approved crop or otherwise be detrimental to the quality of said crop, then the Owner shall provide the Suppliers written notice of this determination. This notice shall contain the basis for the determination together with an acceptable limit for the constituent identified.

(f) Within sixty (60) days of this notice, the Suppliers may respond with information and analyses which demonstrate to the satisfaction of the horticultural scientists who made the determination of reduced productivity or crop quality as described above that the determination was erroneous or that the concentration level of the constituent identified resulted from temporary conditions not expected to reoccur. As an alternative, the Suppliers may respond in 120 days of the notice with a plan for additional or modified treatment practices or other remedial action by Suppliers or management practices available to the Owner, including reduced irrigation, which will protect agricultural productivity. The horticultural scientists shall approve any plan submitted as soon as possible.If the Suppliers provide a plan for implementation of new treatment practices or other remedial action by the Suppliers, then this plan will include a timetable for implementation requiring construction or other necessary steps as soon as possible, which will not result in additional expense to the Owner, consistent with sound engineering practice, regulatory approvals and other factors governing the implementation plan.

(g) If, within 120 days of the notice from the Owner provided for herein, the Suppliers are unable to demonstrate that the determination of reduced productivity or crop quality as described above is erroneous or provide a plan for treatment practices or Owner management practices, or if the Suppliers are unable to comply with the implementation plan provided, then the Owner shall have the right to terminate this Agreement for cause and the "buy out" provisions of subparagraph 6(c) herein shall not apply.

(h) If any analysis conducted by Suppliers or other qualified persons or laboratories indicates that the maximum average concentration of any constituent identified in Exhibit "B" exceeds the concentration limits established for that constituent, then the Suppliers shall immediately cease delivery of reclaimed water to the Owner until such time as the maximum average concentration of the constituent is within acceptable limits established in Exhibit "B".

4. VOLUME OF WATER; DELIVERY SCHEDULE.

(a) The Suppliers will deliver and the Owner shall accept and use a volume of ______ acre-feet of reclaimed water per year in approximately equal weekly quantities (hereinafter referred to as a "weekly allocation") in accordance with a delivery schedule established by the Suppliers as provided below. The Suppliers may, at their discretion, install appropriate meters at the point of delivery so that the volume of reclaimed water delivered may be monitored. Unless supplying water under adverse conditions as provided in Section 5 below, the Suppliers shall deliver reclaimed water under a minimum pressure of 40 pounds per square inch. This water shall be delivered to a point on the Owner's property line or any other point agreed to by the parties and if delivery is made to a point within the Owner's property boundaries, the Owner agrees to provide necessary easements for the construction, operation and maintenance of the Suppliers' distribution system within the Owner's property. The Suppliers shall consult with all Owners entering into like agreements in order to establish among them a mutually beneficial delivery schedule for the quantity of water to be delivered so that under normal conditions each Owner shall receive a weekly allocation which shall be applied, ordinarily, within a forty-eight (48) hour period. Reasonable efforts will be made by the Suppliers to accommodate the irrigation systems and practices of all-Owners.

(b) In the event the Owner demonstrates that the volume of water described in Paragraph 4(a) can be expected to reduce the existing productivity of the land described in Exhibit "A", then this volume shall be revised to such lesser volume as the Owner demonstrates will be compatible with the agricultural or other uses of the land existing on the date of this Agreement.

5. DELIVERY OF RECLAIMED WATER UNDER ADVERSE CONDITIONS.

(a) Both parties recognize that adverse weather conditions or unforeseen circumstances may necessitate modification of the normal delivery schedule established by the Suppliers. The Owner shall have the right to restrict or refuse the use of the reclaimed water to be delivered in the event of adverse weather conditions or unforeseen circumstances, for a period of up to four (4) weeks per calendar year, no more than two (2) of which may be consecutive. Notwithstanding the foregoing, the Owner shall not restrict or refuse the use of reclaimed water until all alternate application sites available to the Owner have been utilized to their capacity. Notice to the Suppliers of the exercise of this right shall be provided in writing, in advance. If advance notice to Suppliers is not practical, then the Owner shall give notice of the restriction or refusal upon exercising this right.

(b) Both parties also recognize that adverse weather conditions or unforeseen circumstances may result in a need for reclaimed water greater than the volume set forth in Paragraph 4(a). Each Owner shall have the right to draw additional water, subject to availability of reclaimed water supplies, during these events in an amount equal to two times the weekly allocation each week for four (4) weeks during a calendar year, not more than two (2) of which may be consecutive. During any period in which more than one Owner exercises the right to draw additional reclaimed water, the Suppliers will furnish water under such pressure as the transmission and delivery systems are capable of producing. During these events, the Suppliers shall not be obligated to provide the minimum pressure described in Paragraph 4(a) above.

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(c) If the Suppliers' transmission or distribution system fails for reasons or events beyond the Suppliers' control, then delivery of reclaimed water under the requirements of this Agreement may be interrupted or limited in quantity.

6. TRANSFER OR MODIFICATION OF OWNER'S COMMITMENT.

(a) Sale of Land. The Owner's right to sell, transfer or encumber the land described in Exhibit "A" shall not be restricted by this Agreement, except that written notice of any proposed sale or transfer must be given to the Suppliers at the address noted in Section 11 herein, at least thirty (30) days prior to the sale or transfer and any subsequent party in interest shall be obligated to receive and use the weekly allocation of reclaimed water described in Paragraph 4(a) and the buyer or transferee must execute and deliver to Suppliers prior to the sale or transfer an acknowledgment and acceptance of the prior Owner's commitment under the same terms and conditions of this Agreement.

(b) Transfer of Commitment to Other Land. The Owner shall also have the right to transfer the commitment under this Agreement to other land, within the service area of the Suppliers' transmission and distribution system (hereafter referred to as "substituted land"), so long as the weekly allocation of reclaimed water is to be utilized for the same purposes and under the same terms and conditions of this Agreement. If transferred to another Owner, the transferee shall also execute an acknowledgment and acceptance of the terms and conditions of this Agreement in the same manner described in Paragraph 6(a) above. In the event the Owner transfers the commitment of this Agreement to substituted land, the cost of capital improvements and easement acquisitions required by the transfer to the substituted land shall be borne by the Owner or transferee. All capital improvements for delivery of reclaimed water to substituted land must be designed, constructed, owned and maintained by the Suppliers.

(c) Buy Out. The Owner shall have the right to terminate the commitment to accept reclaimed water under this Agreement by providing advance notice and payment of a termination fee to the Suppliers as set forth in this paragraph. If the Owner exercises this right during the initial year of the twenty (20) year term of this Agreement, the fee shall be $3,600 dollars per acre for all land described in Exhibit "A." This fee constitutes an allocated share per acre of the estimated construction cost for the distribution system built at the Suppliers' expense. If terminated during subsequent years, the fee shall be reduced by five percent (5%) for each year after the initial year of the twenty (20) year term. This Agreement may be terminated 180 days after written notice to the Suppliers of the Owner's exercise of this right and payment of the termination fee, unless the Suppliers are able, within a shorter time, to identify and connect substitute lands or accommodate the reclaimed water supplied under this Agreement with other land then utilized for this purpose and at no additional cost to the Suppliers in a manner which does not reduce the available capacity of the Suppliers' system.

7. INDEMNITY FOR THIRD PARTY CLAIMS.

(a) So long as the Owner shall use reclaimed water delivered for the purposes set forth in Section 2 and under the terms and conditions of this Agreement, the Suppliers shall indemnify the Owner and hold the Owner harmless from any and all claims, actions, suits, proceedings, costs, expenses, including but not limited to attorney's fees, damages and liabilities arising out of the claims by third parties residing on or using the land described in Exhibit "A" or land adjacent or in close proximity to the land described in Exhibit "A" that the use of irrigation water has resulted in adverse human health effects. The Owner shall also be indemnified and held harmless in like manner against the claims by third parties who have consumed products produced on the land described in Exhibit "A" that the constituents in the reclaimed water delivered have resulted in adverse human health effects from the consumption. The Owner shall be indemnified in like manner for claims or demands that the use of reclaimed irrigation water in the manner set forth in this Agreement constitutes a nuisance or is in violation of statutes or regulations for the protection of natural resources and the environment.

(b) The Supplier's obligation to indemnify the Owner shall be conditioned upon the following:

(i) The Owner's compliance with any operating practice restrictions for protecting human health and the environment attached hereto as Exhibit "C" and made a part hereof and with any additional reasonable operating practice restrictions which the Suppliers may establish from time to time and provide to the Owner; and

(ii) Notice of any claim or information suggesting that a claim may be made against the Owner which could result in damages or liability for which the Supplier has agreed to indemnify the Owner and hold the Owner harmless must be provided to Suppliers. Oral notice of the claim or of the information that a claim may be

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made must be provided as soon as practical but not more than seventy-two (72) hours from the time the claim is made or the information obtained. In addition, written notice confirming the oral notice shall be given by the Owner to the Supplier within a reasonable time after the Owner has provided oral notice, and in all events promptly after service of process on the Owner for any litigation which may result in damage or liability, together with a copy of the complaint and summons; and

(iii) Suppliers shall have the option to defend all claims against the Owner upon which damages may be awarded for which the Suppliers have agreed to indemnify the Owner and hold the Owner harmless.

(c) Likewise, the Suppliers shall be indemnified in the same manner described above for similar claims or demands from persons residing on or using land adjacent to or in close proximity to the land described in Exhibit "A", in the event the Owner fails to comply with this Agreement and any operating practice restrictions protecting human health and the environment as provided herein and the claim or demand arises out of the Owner's failure to comply.

8. EXCUSE FROM PERFORMANCE BY GOVERNMENTAL ACTS.

(a) If for any reason during the term of this Agreement local, regional, state or federal governments or agencies shall fail to issue necessary permits, grant necessary approvals, or shall require any change in the operation of the treatment, transmission and distribution systems or the application and use of reclaimed water by the Owner, then to the extent that such requirements shall affect the ability of any party to perform any of the terms of this Agreement, the affected party shall be excused from the performance thereof and a new agreement shall be negotiated, if possible, by the parties hereto in conformity with such permits, approvals, or requirements. More specifically, without excluding other governmental actions which excuse performance by each party, if the FDER fails to approve or revokes approval of alternate application sites identified by the Owner as provided under Paragraph 2(a) and no other site is available to Owner which the FDER will approve, or if any agency prohibits the sale or processing of fruit irrigated with reclaimed water provided under this Agreement, then the Owner's performance shall be excused in the manner set forth above.

(b) The Suppliers will apply for grant funding from the United States Environmental Protection Agency for the construction of treatment, transmission and distribution facilities for delivery of the reclaimed water. In the event grant funding is not approved and supplied by these agencies, the Suppliers shall have the right to renegotiate or terminate this Agreement. The Suppliers' obligations under this Agreement may also be terminated if performance is prevented by third-party litigation, inability to issue or market bonds or any other event beyond the Suppliers' control.

9. TERMINATION OR ASSIGNMENT.

(a) The Suppliers shall have the right to terminate this Agreement at any time if the Owner refuses to receive and use the weekly allocation of water or receives and uses substantially more than the weekly allocation established by the delivery schedule, except as provided in Paragraph 5(b). Failure to exercise this right shall not constitute a waiver by Suppliers to terminate this agreement upon subsequent breaches.

(b) The Suppliers shall also have the right to transfer all or any part of the treatment, transmission or distribution facilities to another Supplier and to assign all or any part of their rights and obligations under this Agreement to an alternate Supplier who shall be bound by and accept, and be exclusively responsible for all applicable terms and conditions of this Agreement.

(c) The Suppliers now intend to deliver, during the term of this Agreement, a maximum daily flow, averaged annually, of fifty million gallons (50 mgd) for application in "Southwest Orange County" (herein defined as those lands west of the center of Range 27 East, in Townships 23 South and 24 South, Orange County, Florida.) In the event the Suppliers propose to increase this flow, then all increased flow for application in Southwest Orange County must be delivered only as requested by a landowner for beneficial use and storage in accord with established delivery practices. Further, the Suppliers shall provide the Owner with written notice of their intent to construct each rapid infiltration basin ("basin") proposed for location in Southwest Orange County. Such notice shall depict the proposed site of said basin and shall state whether the Suppliers have complied with the terms and conditions of Resolution No. ___ adopted by the City of Orlando on ____________________ and Resolution No. ____ adopted by Orange County on ____________________ _____in selecting the site for the proposed basin. At anytime within 15 days after receipt of each such notice from Suppliers, the Owner shall have the option to terminate this Agreement in the event the Suppliers have failed to comply with these resolutions. Unless written notice of termination is received by Suppliers within 15 days after such notification of basin locations, then the option to terminate shall expire. Upon written notice of termination given by the Owner and timely receipt by Suppliers, this Agreement shall terminate 180 days after receipt by Suppliers of such notice to terminate this Agreement.

10. DISCLAIMER OF REPRESENTATIONS AND WARRANTIES

The Suppliers do not represent or warrant that the volume of reclaimed water delivered shall increase the productivity of the land described in Exhibit "A" nor result in changes to the land, crops or vegetation of any kind. The Owner shall secure independent advice and shall make an independent judgment as to the use of the volume of water described in Section 4 and of the quality described in Section 3.

11. NOTICES

All notices required or authorized under this Agreement shall be given in writing and shall be served by mail on the parties at the addresses listed below:

OWNER ______________________
____
____

SUPPLIERS

For the City: ______________________
____
____

For the County: ______________________
____
____

12. INSPECTION

The Suppliers shall have the right, upon written notice to the Owner, and when reasonably necessary to enter upon the Owner's property to review and inspect the Owner's operating practices as they relate to this Agreement and any backflow

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prevention devices between the Owner's irrigation system and any well which is maintained by the Owner.

13. DISCLAIMER OF THIRD PARTY BENEFICIARIES.

This Agreement is solely for the benefit of the formal parties hereto and no right or cause of action shall accrue upon or by reason hereof, to or for the benefit of any third party not a formal party hereto.

14. SEVERABILITY.

If any part of this Agreement is found invalid or unenforceable by any court, such invalidity or unenforceability shall not affect the other parts of this Agreement if the rights and obligations of the parties contained therein are not materially prejudiced and if the intentions of the parties can continue to be effectuated. To that end, this Agreement is declared severable.

15. LAND USE APPROVALS.

This Agreement shall not be construed as granting or assuring or indicating any future grant of any land use or zoning approvals, permissions, variances, special exceptions, or rights with respect to the real property described in Exhibit "A" hereof.

16. APPLICABLE LAW.

This Agreement and the provisions contained herein shall be construed, controlled, and interpreted according to the laws of the State of Florida.

17. EXHIBITS AND ADDENDUMS

This Agreement incorporates the following exhibits and addendums which are specifically made a part hereof:

Exhibit A - Property Description

Exhibit B - Monitoring Plan

Exhibit C - Operating Practices

Exhibit D - Storage Sites

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THIS WRITTEN AGREEMENT constitutes the entire agreement between the parties and has been entered into voluntarily and with independent advice and legal counsel and has been executed by the authorized representative of each party on the date written above. Modifications to and waivers of the provisions herein shall be made in writing by the parties hereto.

Witnesses:

Owner: ______________________________

____

____

STATE OF FLORIDA)

COUNTY OF ORANGE)

Sworn to and subscribed before me this ______ day of ______________________, 19___, by ______________________, Owner.

____
NOTARY PUBLIC

My Commission Expires:

ATTEST:	BOARD OF COUNTY COMMISSIONERS OF ORANGE COUNTY, FLORIDA
______________________________ Clerk to the Board of County Commissioners	By: ______________________________ Chairman
	FOR THE USE AND RELIANCE OF ORANGE COUNTY ONLY.
Witnesses:	Approved as to form and legality, ___________, 19___.
______________________________ ______________________________	______________________________ County Attorney, Orange County, Florida
ATTEST:	CITY OF ORLANDO, FLORIDA
______________________________ Grace A. Chewning, City Clerk	By: ______________________________ Mayor
Witnesses:	Approved as to form and legality, __________, 19___
______________________________ ______________________________	______________________________ City Attorney, City of Orlando, Florida
Witnesses:	OWNER:
______________________________ ______________________________	______________________________ ______________________________

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STATE OF FLORIDA)
)
COUNTY OF ORANGE)

Sworn to and subscribed before me this _______ day of _______________, 19___, by ____________________, the Chairman of the Board of County Commissioners of Orange County, Florida.

____
NOTARY PUBLIC

My Commission Expires:

STATE OF FLORIDA)
)
COUNTY OF ORANGE)

Sworn to and subscribed before me this ______ day of _______________, 19___, by ____________________, the Mayor of the City of Orlando, Florida.

____
NOTARY PUBLIC

My Commission Expires:

STATE OF FLORIDA)
)
COUNTY OF ORANGE)

Sworn to and subscribed before me this ______ day of _______________, 19___, by ____________________, known to me to be the Owner described in the foregoing instrument.

____
NOTARY PUBLIC

My Commission Expires

EXHIBIT "C"

Operating Practice Restrictions

The intent of this exhibit is to identify and define practices for use of reclaimed irrigation water which protect human health and the environment. Other practices will be established after consultation with the Growers Executive Committee.

1. Appropriate warning signs shall be posted around the sites utilizing reclaimed water by the Owner to designate the nature of the water and its non-potability.

2. The Owner will also take all reasonable precautions, including signs and labeling, to clearly identify reclaimed water systems to prevent inadvertent human consumption.

3. No cross-connections shall be made between the reclaimed water system and other water systems.

4. A distance of 500 feet should be maintained between the periphery of the reclaimed water irrigation system application site .and any existing or approved (but not yet constructed) shallow drinking water wells.

5. A distance of 1000 feet shall be maintained between drinking water wells and holding ponds which are incorporated into the irrigation system as an alternate application site.

6. The use of reclaimed water shall be consistent with applicable state and federal regulations.

CONSTITUENT CONCENTRATIONS

Constituents	*Maximum Average Concentration Limits	Minimum Sample Frequency		
		Weekly	Monthly	Quarterly
Arsenic	0.10 mg/l			X
Beryllium	0.10			X
Bicarbonate (Alkalinity)	200		X	
Barium	1.0		X	
Boron	1.0		X	
Cadmium	0.01			X
Chromium	0.01			X
.Calcium	200		X	
Chloride	100	X		
Chlorine	10.0	X		
Cobalt	0.05			X
Copper	0.20		X	
Iron	5.0		X	
Lead	0.1			X
Lithium	0.01			X
Magnesium	25.0			X
Manganese	0.20		X	
Mercury	0.01			X
Nickel	0.20			X
Nitrogen	30	X		
Phosphorus	10	X		
Potassium	30		X	
Selenium	0.02			X
Silver	0.05		X	
Sodium	70	X		
Sulfate	100		X	
Zinc	1.0		X	
BOD_5 (Biological Oxygen Demand)	30			X
Chemical Oxygen Demand	120		X	
Total Suspended Solids	5		X	
EC_w	1100 umhos	X		
pH	6.5-8.4	X		

*Maximum Average Concentration = Average of the last 3 Samples Tested.
Limits in mg/l unless otherwise noted.

3/8/83

EXHIBIT "C"

Operating Practice Restrictions

The intent of this exhibit is to identify and define practices for use of reclaimed irrigation water which protect human health and the environment. Other practices will be established after consultation with the Growers Executive Committee.

1. Appropriate warning signs shall be posted around the sites utilizing reclaimed water by the Owner to designate the nature of the water and its non-potability.

2. The Owner will also take all reasonable precautions, including signs and labeling, to clearly identify reclaimed water systems to prevent inadvertent human consumption.

3. No cross-connections shall be made between the reclaimed water system and other water systems.

4. A distance of 500 feet should be maintained between the periphery of the reclaimed water irrigation system application site and any existing or approved (but not yet constructed) shallow drinking water wells.

5. A distance of 1000 feet shall be maintained between drinking water wells and holding ponds which are incorporated into the irrigation system as an alternate application site.

6. The use of reclaimed water shall be consistent with applicable state and federal regulations.

APPROVED BY THE BOARD OF COUNTY
COMMISSIONERS AT THEIR MEETING
APR 11 1983

RESOLUTION NO. 83-SW-06

A RESOLUTION LIMITING LANDS ON WHICH RAPID INFILTRATION BASINS MAY BE LOCATED AS PART OF THE ORANGE COUNTY/CITY OF ORLANDO SOUTHWEST 201 WATER CONSERV II PROJECT; APPROVING A UNIFORM AGREEMENT AND AMENDMENT NUMBER ONE THERETO FOR DELIVERY AND USE OF RECLAIMED IRRIGATION WATER WITH HI-ACRES, INC., AND OTHERS; AUTHORIZING EXECUTION OF THE UNIFORM AGREEMENT AND AMENDMENT NUMBER ONE THERETO.

PREMISES

1. On February 15, 1983, Orange County adopted Resolution No. 83-SW-04 selecting a preferred wastewater management alternative for Southwest Orange County regarding the Water Conserv II project which includes a combination of citrus irrigation and rapid infiltration basins, and adopted Resolution No. 83-SW-03, recognizing the organization of a Growers' Executive Committee and assuring that productive citrus groves or dwelling units located within "Southwest Orange County", will not be the subject of condemnation proceedings. For the purpose of this Resolution "Southwest Orange County" is defined as those lands west of the center of Range 27 East, in Townships 23 South and 24 South, Orange County, Florida.

2. The Grower's Executive Committee and other property owners have requested assurance that the area in which Rapid Infiltration Basins will be located within Southwest Orange County, be defined and limited;

3. The Growers' Executive Committee and property owners will rely upon representations made by the City of Orlando and Orange County as to th location of rapid infiltration basins as the basis for entering the uniform Agreement for the Delivery and Use of Reclaimed Irrigation Water;

4. Based on available information, the City and County have determined that the area described in this resolution will be sufficient to accommodate all necessary rapid infiltration basins, in combination with the anticipated volume of water to be contracted for and accepted for citrus irrigation and storage purposes.

5. In addition to the above, the County and City have negotiated an agreement and amendment Number One thereto with Hi-Acres, Inc., and others to accept and use large volumes of highly treated, reclaimed water on their lands and to implement large storage sites on their property for the temporary storage of said water which may alleviate additional rapid infiltration basins except as required for system operational considerations.

BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ORANGE COUNTY:

1. The Southwest 201 Water Conserv II project, as a joint project of the City of Orlando and Orange County, is designed to dispose of 50 million gallons per day (mgd) of reclaimed water through a combination of citrus irrigation and rapid infiltration basins.

2. The area to be utilized for rapid infiltration basins within Southwest Orange County throughout the term of the Water Conserv II project shall be defined and limited to that 1,640 acre area depicted on the diagram attached hereto as Exhibit A and more specifically described by the legal description attached hereto as Exhibit B.

3. In the event that any of the acreage within the area designated in Exhibit A cannot be acquired, the County and City will have the right to acquire sufficient land outside the area designated in Exhibit A having a disposal or storage capacity equivalent to those lands within the designated area which cannot be acquired; provided, however, that land outside the designated area shall be acquired without condemnation of dwelling units or producing groves as defined in Resolution No. 83-SW-04 by Orange County on February 15, 1983, and provided further that on any land outside the area depcited in Exhibit A and within Southwest Orange County no rapid infiltration basins shall be located within 1,000 feet of any dwelling unit and no rapid infiltration basins shall be located within 125 feet of a producing grove without the written approval of the grove owner or, in lieu thereof, the written approval of the Growers' Executive Committee. The City and County shall consult with the Growers' Executive Committee before selecting additional land outside the area designated in Exhibit "A", if such additional land is needed.

4. The Board of County Commissioners of Orange County hereby approves the form of the Uniform Agreement for Delivery and Use of Reclaimed Irrigation Water, as amended, attached hereto as Exhibit C and authorizes the Chairman of the Board of County Commissioners to execute said Agreements and Amendment with citrus growers, using the form attached hereto, for delivery, disposal and use of reclaimed water.

ADOPTED THIS 11th DAY OF April, 1983.

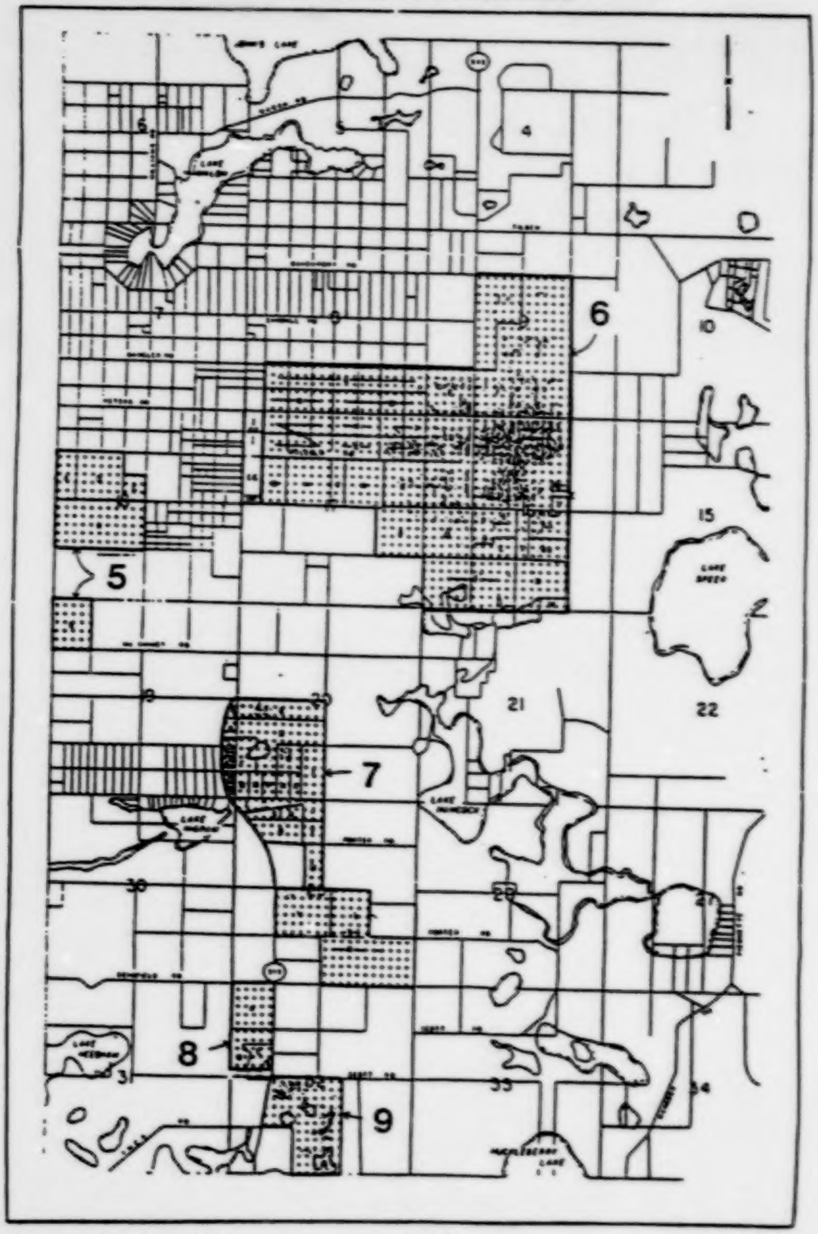
Lou Treadway
Chairman, Board of County
Commissioners of Orange County

ATTEST:

Mary J. Garrison
Deputy Clerk to Board
of County Commissioners

EXHIBIT A

Rapid Infiltration Basin Locations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